Technology as a Part of Care Service Production

Concept Design Case for Wiktio

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Abstract

The current demographic change, the weakening dependency ratio in Finland means that there is a decreasing amount of working people taking care of children, elderly and disabled. Thus, there is a need to find ways to produce care services more efficiently but also with higher quality. The client of this thesis owns a technology for care service environments the purpose which is to support personnel's daily tasks in a work that aims to fulfill the end customer's needs holistically. The purpose of this thesis was to find development needs and opportunities for both the technology and for the transformation of care services.

The technology was considered to be a part of care services, thus it was researched as a whole. The work utilized methodologies discussed within Product Service System literature and service design. Customer journeys, actor network maps, system diagrams, use cases revealed regularities, touchpoints, and aspects that were seen as urgent needs or opportunities for development. Information for the work was based on literature reviews, interviews, and observations at care service premises. The insight and ideas were formulated into three differentiated visualizations the purpose of which purpose was to communicate the main role of the technology as well as new ways to produce the care service with higher quality and in a meaningful manner.

Key findings related technology were that availability of information and flow of it between different actors can have an impact on how the caregivers are able to give quality care, and on the other hand, that the technology can block the workflow and thus decrease the service performance. Other findings on the care services suggest that the service mentality can vary a lot in different service units which also relates to how relatives and other actors around the end customer are able to contribute on one's life.

The work proposes that in the current care service production the workflow of caregivers should be streamlined by automating and pre-filling certain daily tasks, and that platform for shared information between different actors is required. However, this would not provide any kind of platform for a radical change in the current care service production. Thus, the more appealing areas for development could found in between consumers, their social networks, and different non-governmental organizations. In this context the implications for wellbeing could be more significant.

Keywords Care Service Production, Service(s), Products, Technology

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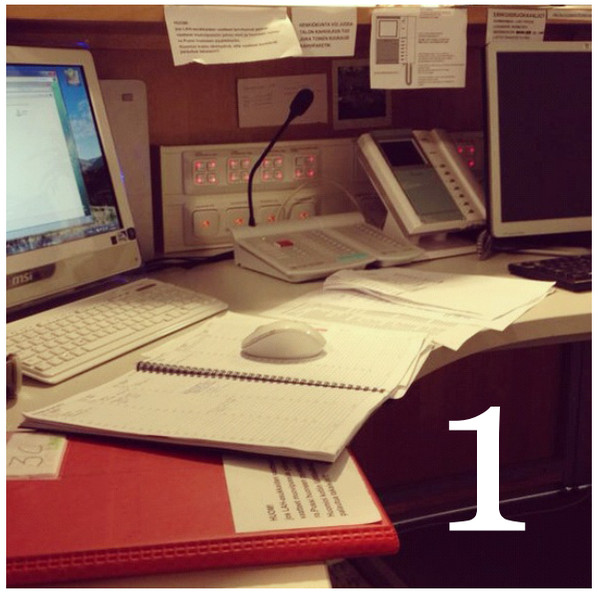


Introduction

The general context of this thesis is use of technology in care service production in care service units in Finland. The client of the work is a small company called Wiktio which provides technology for care services as well as consulting related to the design of physical service premises. During the time of writing this thesis, Wiktio is going through a process of refining its operations and offering. Whether Wiktio will lean more towards development and consulting business or focus more on the development of technology and supply of it. Whatever Wiktio is going to be, this thesis is related to the refining process and tries to find answers especially for technology's future. Since the technology is currently installed into three care service centers, it is worthwhile to be evaluated and explored how it could affect positively the care service production in order to enhance the wellbeing of the end customers.

The end customers of care services can be for example elderly or disabled people. Generally care services in Finland include health services, housing services, care services, memory rehabilitation to name a few. (www.stm.fi, 2012) The care service production consists of and is surrounded by different actors: caregivers, management, assistants, nurses, and takes often place in specifically designed premises which in this thesis are

called care service centers or units, being so that the centers may consist of several units.

In this thesis it is assumed that the decreasing dependency ratio and new generations in need of care services will pressure care service providers to transform and find new ways to produce the services more efficiently yet more effectively as well. It also believed that the way the care service provider faces the client as an individual and provides customized services becomes an increasingly competitive advantage especially in the private sector. This change will require new tools and approaches to care service production. Wiktio and Iwo-system may have opportunities to intervene and enhance the quality of the care service.

Care service production's purpose is to support the end customers to cope with their everyday life. More specifically for older people, the purpose is to further their functional capacity, independent, and active involvement in society. Services such as elderly care services are ensured by the Finnish Ministry of Health and Social Affairs (STM) whose duty is to take care of the health and wellbeing of the population, and it is the municipalities responsibility to organize such services. (www.stm.fi, 2012) The services can be produced by the public, private and third sector. Sometimes all the sectors are involved in a way or another in caring of an individual which must be challenging for example from the information flow point of view.

Anyhow, people in need of care services are surrounded by different actors who try to ease the daily routines and tasks, and in my opinion, to make it also meaningful for the end customer. They are also surrounded by physical surroundings and tangible, sometimes interconnected objects. Some of these objects contribute strongly to or enable the value creation in the care service.

In Finland the dependency ratio will weaken rapidly during the next ten years. This means that there will be less people at the working age compared to the retired and children. (Myrskylä, 2012) Obviously, the change creates economic pressure to deal with the expenses, but later on it will also be necessary to find ways to deal with more and more people in need of care. As the baby boomers (Generations born 1946-1964) retire and require assistance and care, this will add another problem to the mix. The post-war born generation's needs and desires can vary a lot and be more diverse compared to those of the pre-war generation. (Kuusi, 2001) These factors may change the way care services are to be
produced in the near future.

1.1. Care Service Work in Practice

As outlined above, the main purpose of the practical care work is to maintain a person's life quality. Practically, in care service units and in home environments this means tasks like helping the end-customer with their daily activities such as to take care of hygiene and medication, to help with their diet and to escort them to cultural activities . The activities and services may vary a lot depending on an individual's condition, (but also depending on the service offering). Others need more physical assistance, whereas others may need just reminding or assistance with medication. Overall the care work seems physically demanding and require efforts in peaks around the morning, lunch time, dinner and evening. The breakfast or dinner period itself is not the most demanding moment in service work, but to get customers up and moving, change clothes, get them washed and/or assist them at a toilet creates peaks.

In between the core moments of the breakfast, lunch and dinner there would be time for leisure with residents which would be beneficial in filling up the social needs of the elderly. However, in between the personnel need to take care of dirty sheets, diaper supply, dishes, taking care of somebody's appointments with a doctor and so on. During these gaps, the observation made during this thesis study, suggests that customers spend their time on their own. This is of course unit specific since every unit has different people and culture. An interviewee (relative) gave another, more positive example as well. At one care service unit, the personnel spend time with their customers as they would with their own relatives; this gives a very warm feeling for a customer and for visitors as well. The interviewee could not say, was it about physical premises or only about the people and the working culture. It is possible that space arrangement and furniture can play a big role in how the personnel act among their customers.

At the visited units, it seemed that the workers followed the schedule tightly. For example as the food was served, everyone was brought to eat. This created a hassle at the corridors and hallways. Even though it may be a special occasion for the residents, from outsiders' point of view it looks like a hassle created by the personnel's simultaneous actions and unnecessary sense of hurry. This could be compared to traffic lights that turn green simultaneously after a long wait and every car rushes to the next lights to wait. A roundabout would work more fluently and softly. In the light of this study it seems that the actions the personnel make and the way in which those are performed affect the atmosphere even more than the physical premises.

The products the caregivers handled were aids such as wheelchairs and hoists that helped the end customer to be moved around or to be rehabilitated. The information technology products and pieces of software were numerous; this thesis will later on look at the role of those products and seek the possibilities to develop the systems for Wiktio.

1.1.2. Quality in Care Services

The Finnish Ministry of Health and Social Affairs (STM) emphasizes that the care service work should be customer-driven, ethical and rehabilitative. It should also be based on service plans, contracts, recommendations. (www.stm.fi, 2012)

The quality of both municipal and outsourced services are supervised and instructed by the National Supervisory Authority for Welfare and Health (Valvira) and the National Institute for Health and Welfare (THL) (www.stm.fi, 2012). In practice this means inspections to care service locations and the processing of complaints about elderly care. (Valvira, 2012) Valvira emphasizes that care service providers should self-monitor that they meet the requirements provided by law. Valvira states that every service unit should have a care quality management system for quality monitoring, assessment and development.

There, however, is no standard for quality management system, but it could include a "quality manual". In care services the supervision focuses on aspects such as safety, space, accessibility, room (size), fulfillment of clients basic needs and care service plan, service plan, documentation and archives, to name a few. (Vanhustenhuollon valvontasuunnitelma, 2009) Some of these are easy to measure, for example the room size, or how many times the nurse visits the customer even though it would have nothing to do with the way in which the end customer perceives "quality". On the other hand, some other qualities are too abstract to be measured numerically, e.g. psychological activity and quality, and this is where it would imaginably be very easy to make shortcuts as a service provider and as a caregiver. Thus one wonders, could the technology help the personnel perform their daily tasks more efficiently and effectively, and yet orient them to pay attention to their customer's psychological nature as well.

1.2. Technologies in Care Service Production

As in any organization within care services, there is a substantial amount of different technologies in use in different levels of the organization. Patient information system, Enterprise Resource Planning systems, Customer information system and so on are basic tools at any care service organization management. The caregiver deals more with tangible technologies such as nurse call systems, adjustable beds, a blood pressure monitor etc.

There have been attempts to classify the technologies in many ways in order to understand the extent of them, and to facilitate the creation of use objectives. Well-being technology refers to the use of modern technology to promote human capabilities and to maintain health. The key well-being technologies categories are the health technology and gerontechnology. (Raappana & Melkas, 2009) The latter refers to technologies which are developed for elderly. The care service organization deals also with other technologies, in other words software, such as human resources management systems (HRMS) and billing systems. Also spreadsheet and calendar applications are used as in many other service organizations. Even though computers full of different applications are used throughout the care service organization, the staff relies in some cases on pen and paper. For example notes from a meeting between a doctor and resident are written on paper and stored into physical folders. Is it because of inability to utilize the technology, or does it just make it easier and more fluent?

From the above mentioned technologies, the health technology and gerontechnology are closest to practical care work and thus under the main focus in this thesis. Gerontechnology, can be divided into passive and active technologies. (Raappana & Melkas, 2009) In the context of care services, passive technologies within care housing, such as a stove guard, safety faucets, access control and GPS locators are there to prevent accidents, and they are monitored automatically. Active technologies such as a wellness wristband, lighting, robots, drug dispensers, can be actively used and experienced. Such gerontechnologies are, or could be, in the Iwo's case integrated into technologies which are used by care service personnel. These technologies are for example patient information systems, enterprise resource planning (ERP) systems, and nurse call systems. In addition, there are technologies such as fire alarm systems and building automation systems which are critical elements in care service units.

Since the technology seems to be closely related to the production of care services the context can be seen as a product service system (PSS). Also Wiktio's offering will be viewed as such since there are service elements such as customization and maintenance included in the Iwo product.

1.2.1. Iwo system

The study and development objective of the thesis Iwo is a simple ERP system with integrated security. Iwo has been developed by Wiktio which is a small company focusing on care technology as well as on the development of (care) service and living environments. It has initially been designed to be a tool for caregivers and for service

unit management. Iwo combines care service personnel's software tools with gerontechnology products as well as with building automation. For management, it gives tools for shift planning and customer information management. Thus Iwo can be described as full solution for a care service units. Basically iwo consists out of set of products and software applications. The software can be used with a PC web-browser and smart phones. These "sets" can be customized for different care service units.

When looking at the material Wiktio provided for this work, it seems very justified to propose an integrated product service system for the care service production. The amount of products or single solutions in the market seem vast. Service providers need to find the products they are required to have and integrate it into their systems. This means a lot of work, but it also means a lot of different devices and different interfaces with different logicalities. By providing an integrated set of products and services, it would be possible to reduce the amount of scattered information. By automation and unifying the logic of interfaces, the cognitive load of the users can be also reduced.

The features and products of Iwo as well as the role of its care service production will be described more thoroughly in chapters 2 and 3.

1.2.2. Customers, Competitors and partners

The market for such a system as Iwo is complex since there are both the private (including 3rd sector) and the public sector as potential customers. Both sectors have services in service units and both provide services to homes as well. The public sector compensates the shortage of service by buying workforce and service from the private sector. The end customers can get a service from a public actor, from a private actor, or one can buy it from a private provider with own money. This creates a dilemma where several actors work for one person with different tools and rules. The tools, or systems and approaches may not differ only between the private and the public sector, but also for example inside municipal care service units and home care as well. (Interviews: Virta, Helsinki. Mansikkapaikka, Rauma.) For a technology provider this must be a difficult area to build up a credible value proposition yet when the buyer or subscriber is different from the user.

However, in short the main customers and users consists of care services in the private and the public sector. (Interview, Virta) Currently Wiktio's existing clients consists of public care service units, excluding the pilot project Villa Jussoila. With a minor development Iwo could be provided also to home care service providers. Con-

sumer markets remain still as an unknown area, but pure in pure consumer markets the competition would be against home electronics and communication devices.

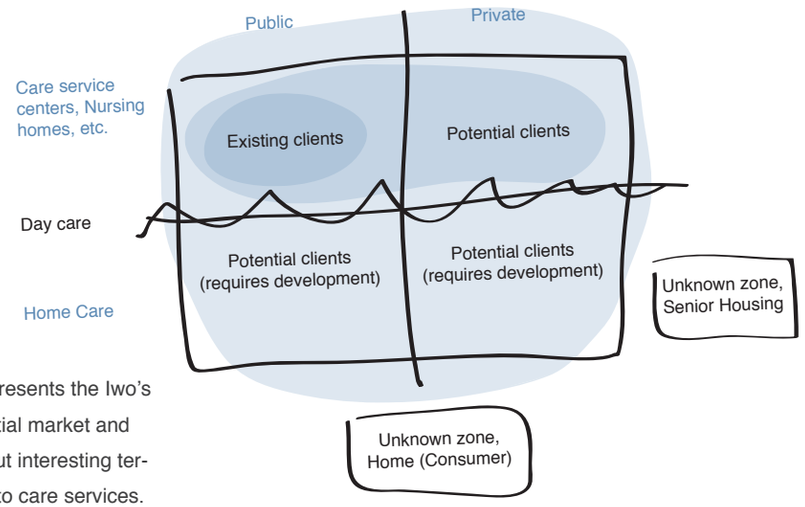


Figure 1A represents the Iwo's current potential market and understood but interesting territories close to care services.

The evident users of such systems are care service organizations' management, caregivers, nurses and residents. However, customers and buyers, the final decision makers, are often different. The buyer can potentially differ from municipalities, public or private organizations to construction companies and electrical contractors. During the project one of the actors will be responsible for ordering the systems for care services, this is a point where such ERP- and security systems are sold. Especially in public projects the requirements are often strict and based on existing paradigm care service operations and technologies, thus small but technically advanced companies may have problems in succeeding in public projects. The bidding model and customer network includes a lot of complexity, vagueness and challenges that would be worth of another thesis work. However, as a by-product of this thesis, some cues are expected to be found on how Wiktio's offering could be clarified and Iwo productized for such a complex market.

Nonetheless, there are few actors competing in Finnish markets to be reckoned as Iwo's competitors in both the public and the private sector. Miratel, Tunstall, FastROI and Seniortek, all provide systems for care service units. These companies often provide single solutions specifically for security, ERP or to building automation. As mentioned, Iwo combines these solutions in order to reduce complexity and pain in design, order process and implementation.

Miratel and Tunstall, which are currently part of ASCOM, are the biggest and most well-known companies also on global markets, FastROI and Seniortek are Finnish small-medium size companies. What comes to organizational tools, FastROI appears to be the closest to Iwo as a system as it is divided to different reporting, billing and ERP-features. Tunstall and Miratel are the ones to base their business products and solutions. By solutions I mean combinations of products that contain for example a nurse call system. Since Wiktio and Iwo do not design or sell only products, the two are both competitors but also potential partners. Seniortek is regarded as a technology integrator as well, but their systems are closed, not customizable to an extent that for example Iwo is. (Workshop, 4.6.2012)

1.3. Objectives and Goals

This thesis is a concept design project the objective of which is to find new development opportunities for Iwo within the care service context. Concept design aims to build up future scenarios of a company, its product and their operational environment. The implementation of a product and service related to it may need further development of technologies and service infrastructure. Thus, the future scenarios have to be made visible in order to breed the business (and development) to realize the desired concept. (Keinonen & Jääskö, 2004) The work considers both the service and the product to be designed in order to give solutions to identified problems holistically. It can be described that it settles in between areas of product design where the emphasis is on the artifacts, and pure service design which is about making the service useful, desirable, efficient and effective (http://www.designcouncil.org.uk, 2012).

The goal in general level is to understand what care services consist of, who are the actors in it, what technologies are utilized and how. More specifically the is aim is to make sense of Iwo by visualizing what it consists of, who are the users and actors related to it, what are the touchpoints, and what is the role of it within the care service production. The touchpoint identification is important since the opportunity to create value to the customer lies in them (Brown, 2009).

From a strategic point of view, I believe that achieving these goals will give substantial information for future development of Iwo but also give insight on how such an IT-system and services related to it could change the existing paradigm in care services to more humane and effective in order to enhance the wellbeing of the care service customer.

As a final outcome of this thesis, there will be three visualized concepts that will capture essential ideas that came up during the exploration process. These concepts are there to give concrete examples how Iwo could be developed in order to enhance the wellbeing of the elderly. On the other hand, it is questioned, if people need this type of care service system. This work tries also to steer away from the existing care service paradigm and see if there were other models to fulfill needs of the elderly and disabled and see if Iwo could help in it.

1.3.1. Research questions

From the above described objectives and goals I have elaborated research questions into which I hope to find answers which inspire and justify the concept creation process.

The research questions are as follows:

- What is the role of Iwo in care service production?
- How it is used, for what, by whom?

- How should Iwo be developed further?
- How could Iwo transform care services into more effective and efficient in order to enhance the wellbeing of the client?

1.3.2. Care Service Customer Need's

The objectives and goals of this thesis (described earlier), are subordinate to the needs of the final customer, in this case the elderly people. However, Iwo will be developed in a manner that it should somehow address the probable issues of the final customer, it should directly or indirectly help the care service network or provider to produce better service.

Nursing process, the care work, is the core process for the practice of nursing which aims to fulfill and maintain basic human needs. (Yura & Walsh, 1983) This statement leads to keeping in mind Maslow's basic human needs: the physiological needs, the safety needs, the belongingness and love needs, the esteem needs, self-actualization needs. (Maslow, 1954) Thus, instead of making an extensive research of elderly needs, I will look at factors which are often addressed within the care service discussion. From the chosen factors I will form a synthesis which I will use as guidance in the

exploration process. Some of the explored factors can be considered basic human needs which should be fulfilled in any case, some are more closely linked to care services and issues experienced differently by individuals.

In Finland the Ministry of Trade and Industry's publication Väyrynen, (2003) emphasized that technologies and innovations should be directed to support older people's ability to retain their full rights as members of society as long as possible. This requires that innovations should enhance elderly people's possibility to live independently and to take care of oneself, support elderly sovereignty and dignity, promote possibility to self-actualization. These aspects are generally in line with what Danish elderly social and humanitarian nonprofit association Aeldresagen promotes as "core values" for assisted living: Influence on one's own life, respect for dissimilarity, focus on humanity, pleasant experiences every day, dignified end-of-life care. The values are to guide the caregivers to act and to help with issues the elderly face while living in assisted living accommodation: Poor health, social isolation or insufficient social contact, immobility, inactivity are the main issues threatening the well-being of the elderly. (Hastrup, 2012) These issues are not only related to people who have received a place in assisted living accommodation, but are also relevant while discussing about independent living in general. According to Raappana and Melkas (2009) the areas which require support in independent living: Daily routines at home and around it, communication and interaction with family and friends, movement outside the home, access to services such as to bank and shops, community outreach. The above-mentioned aspects and values can be linked to Maslow's basic needs which the care work process aims to address.

However, the perception of basic needs probably varies over time and as the standard of living rises different generations must have a different view on what is good care service, what is good aging. Among many other countries Finland is facing a generational change as baby-boomers get retired and older. Compared to pre-war born generations the baby-boomers will have more differentiated needs, or at least desires, which will create pressure to improve (or transform) the care service production. (Kuusi, 2001) Even though the post-war generation would not yet represent the majority in need of care service, I find it important to set course to serve them but also to exploit their skills in the near future. Kuusi (2001) sums the factors the aging baby-boomers will have compared to older generations:

- Diverse set of lifestyles and values
- More wealth to improve the quality of life
- Better education, better cognitive and physical skills
- Differentiated family- and work history and gender roles
- Differentiated living conditions, more people owns houses, apartments..

- Differentiated consumption patterns and attitudes towards consumption
- Preparedness in society and in different policy arenas
- Trust on one's skills and ability to favor own interests
- Tendency to actively seek help to personal problems

Values and factors presented by Väyrynen, Kuusi, and Hastrup can be found very momentous and linked to the quality of care. Still, it is important to synthesize those into a more compact and focused set of factors which should sensitize the research phase to pin point valuable development opportunities while exploring Iwo and the care service production. Design drivers for the concepts will be formulated during the research phase and concept creation itself.

No matter how Iwo system as a part of care service system will be developed in the future, it should directly or indirectly address the following factors which can be linked with quality care and well-being of the elderly:

- Individuality and respect
- Social interaction
- Safety and preventive care
- Independency

1.3.3. Framing

Because of the vastness of care service systems, it is necessary to scan them roughly but thoroughly enough and after that to focus on the essentials. Iwo-system can have several users such as caregivers, care service management, end customer and also relatives. The elderly and relatives are initially framed out of the main focus of the study, even though the earlier stated guiding factors are kept in mind. The focus of the study will still be on the care service system and production and Iwo's role in it.

Care service production system itself may have issues which relates to technologies as well as to procedures and social context which inhibit the efficiency and effectiveness of the service. This means that it is necessary to look at the production and the context in order to find out issues that are on the way or disrupt the fulfillment of end customer needs.

1.3.4. Methodology

Since the thesis includes concept design of a system that includes products and services, both Iwo and the care service production will be looked as a product service system. The thesis process will in general level follow methodology presented within Product Service System (PSS) literature. PSS design shares many methods that are common with service design, thus the exact methods will be derived from there. However, the PSS methodology gives a clear point of view that encourages to look at the actors and their roles while exploring and designing a PSS. The methodology consists of the following steps:

1. Analysis and interpretation of the context (to identify the actors in the network)
2. Development of the system (envisioning possible PSS scenarios, verifying use cases, sequences of actions and actors' role)
3. Representation and communication of the solution (..to represent a PSS in all its components, i.e. physical elements, logical links and temporal sequences)

(Tukker & Tischner, 2004. Morelli 2007, 2006)

Analysis and interpretation of the context

The first step can be regarded as a research phase. In this thesis its purpose is to identify relevant social groups and actors (Tukker & Tischner, 2004), as well as the currently existing technological elements. This phase requires qualitative data collection and applies several methods. In its nature qualitative research is holistic acquisition of knowledge which compiles the material in natural and real conditions. (Hirsjärvi et al. 1997, p.155,) The qualitative research is e.g. interested in finding regularities, identifying elements and interconnections (Tesch, 1992). The analysis of material will contain multiple point of views; what is important is not ruled by the researcher. (Hirsjärvi et al. 1997, p.155,) The qualitative data analysis consists of three simultaneous flows of activities: data reduction, data display, conclusion drawing / verification. (Miles &Huberman, 1984, p.21-23) These activities will be conducted by using methods (described below) familiar from service design discipline.

To build the initial understanding, the information was gathered by interviewing different actors related with care service production. These interviewed actors from the practical care work include the head of a care service unit, four caregivers, one nurse from care service unit, one nurse working at institutional care. These interviews were complemented by interviews with the CEO of a care service company, a planner from Helsinki social services department, a relative of two persons living in care service units, a senior consultant from field of Health care technology and Services, and two

project managers from a project that teaches technology for elderly. Two interview sessions with the three caregivers and the head of a unit were semi-structured and guided by theme questions related to their practical work. The interview with a nurse and a caregiver concentrated on Iwo system and use of it, within this interview the interviewees had also a chance to comment on ideas of new Iwo user interface. The interview with the care service customer's relative focused on experiences of the relative on care services as well as on the customer's experiences. Open unstructured interviews with project managers and the nurse from institutional care were arranged spontaneously. Other interviews were held under a theme of care service production and technology.

Most of the observations were made by shadowing; it involves the researchers immersing themselves in the life of customers, personnel, or other actors in order to observe their behavior, and it allows the researcher to spot the moments at which problems occur. (Stickdorn & Schneider, 2011). Shadowing were made both during the interview visits and during excursions to different care centers by simply being present and observing behind the scenes. All in all five different care service centers were visited. Because of the nature of care service environments and the fact that there is also people suffering from dementia it is often forbidden to take photographs or video. Thus, all the documentation are writings and sketches on a notebook, and still the researcher needs to consider that he may influence the behavior (Stickdorn & Schneider, 2011). For that reason, in order to avoid the "observer effect" even the notes were made right after the visit. However, this approach gives the opportunity to identify the moments where people's sayings and doings do not match (Stickdorn & Schneider, 2011). At one particular care center a caregivers were followed up and interviewed during a day in the care service environment. This approach can be called 'contextual interview' and it is an ethnographic technique in which the researcher both observes the customer or personnel and asks questions. In this situation the interviewee is often more comfortable to provide insights and remembers the specific details easier (Stickdorn & Schneider, 2011). In this case the notes were written constantly at the unit and few photographs were taken with a permission. It is reasonable to go through the contextual interview since it tied up the bits and pieces of earlier randomly observed moments.

Since Iwo product is a part of care service production, the product is split into both products and services in order to make sense what the production system consists of and what is the role of Iwo in it. This is done by using Product Service System (PSS) categorization by Goedkoop et al. (1999) as one tool to analyze the system. The categorization will be made along with literature reviews, and by interviewing and observing different actors involved in the care service process. The research phase contributes both to making sense of the products and service actors, but also to interpreting the cultural and social patterns that may emerge within the context. The latter patterns are important to understand since the designer and design approach contributes to translating such patterns into a "consistent and visible set of requirements for the definition of future PSS" (Morelli, 2002). The point of PSS will be discussed more thoroughly in the next chapter.

Development of the system

Gained information and understanding will be synthesized in form of diagrams and illustrations. As in the PSS methodology description these represent use cases and scenarios that include also information such as the space in which the service takes place and actions "beyond the line of visibility of the service (Tukker & Tischner, 2004)." If compared to other design processes such as IDEO's Deep Dive, it can be found that the purpose of this phase is also to translate the research into opportunities for design (Moen, 2001). Morelli (2006) presents tools such as customer journey mapping and service blueprints that are also commonly used in service design. (Stickdorn & Schneider, 2011) Thus, it is justified to identify the actors by building the current end customer journey through different situations in the care service context. This type of map is also beneficial since it "enables the identification of both problem areas and opportunities for innovation, whilst focusing on specific touchpoints allows the service experience to be broken down into individual stages for further analysis (Stickdorn & Schneider, 2011)." One tool to synthesize the information about the connection of different stakeholders in care service production is 'actor network mapping'. This "gives an overall picture of the network of actors and components in the system. The focus is on roles, grouping and relations. The grouping aspect of the technique is used to organize the actors by their function." (Morelli, 2007). Stickdorn & Schneider (2011) presents a 'stakeholder map' which has the same purpose. Their description adds that actor groups in the map can be categorized according to their importance and influence; a map can also be in various formats. The latter applies to other methods as well, thus the freedom to shape the methods on the move will be taken in order to support the case. In addition to the above described methods, there will be graphical representations, or adapted systems diagrams, of Iwo and another product alike and their interconnections in their environment. These illustrations will give a concrete view on what Iwo consists of and where it is placed, thus those also contribute into building up the understanding of what is the role of Iwo.

Representation and communication of the solution

> “Call it serendipity or even luck, once you start drawing or making things, you open up new possibilities of discovery.” (Kelley, 2001)

The previously described phases brought up also ideas and thoughts that were drawn on paper. These illustrations were mostly single solutions or features that were not yet part of any specific systemic concept. The actual ideation and visualization was made later on in order to produce more holistic ideas on systems level; this ties the previously produced ideas into the final product service system proposal. As in concept design, the final refined ideas are communicated in form of visualized concepts with material that supports proposed solutions. A concept has to be presented in a form that is easy to understand (Keinonen & Jääskö, 2004) in order to feed the decision making in Iwo’s development.

The illustrations can be described as an adapted scenario-system diagram hybrid, which are combined with the included the product layers. The scenarios examine the potential problems with new service ideas, or in this case with new PSS ideas, might encounter (Stickdorn & Schneider, 2011).


2

Identifying the Actors and Elements in Care Service Production

This chapter describes the concept of Products Service Systems (PSS), its advantages and categorizations related to it. Care service production and Wiktio's approach in the market will be reflected along. By using the tools described in the previous chapter, it will be later clarified what Iwo is and its context of use, the care service production system. This chapter will also give a hint of Iwo's role which will be discussed more thoroughly in chapter 3.

2.1. Product Service Systems

The term 'Product Service System' or PSS originates from studies which have analyzed potential of different integrated solutions to reduce environmental impacts of consumption and a company's ability to deal with globalization and business activities. (Matzen et al., 2005) Although PSS has a strong connection to ecology, it also has to focus on social and economic aspects as well in order to achieve sustainability. (Morelli, 2011) However, less often sustainability is seen as the ultimate goal. Thus, PSS has been adopted in management and marketing disciplines and it is becoming a part of design discipline as well. (Baines et al., 2007)

The idea of combining products and services together is nothing new, it is more of an metaphor created by consultants and researchers "for an approach, which has been known and utilized by several types of companies for many decades: suppliers of aeroplane engines, large software installations, transport and logistics systems are a few examples of these." (McAloone et al., 2006)

2.1.1. Definition

In short PSS is an integrated set of products and services joined together to fulfill a user's needs (Goedkoop et al., 1999) and to deliver value in use. (Baines et al., 2007) In this definition the 'joint' is the "System: The (value) network, (technological) infrastructure and governance structure (or revenue model) that 'produces' a product-service." (Tukker & Tischner, 2004) In a PSS solution the customer does not necessarily have to care about purchasing every single piece of equipment, arranging service nor taking care of ownership of a product. A customer's need is to get the performance out of the solution and the PSS provider's task is to ensure it. (Baines et al., 2007) This is the basic and yet product related idea behind PSS.

PSS can be offered by a single solution provider, or it can be co-produced and offered by joint ventures or partnerships (Morelli, 2006). As a solution provider Wiktio relies with Iwo on partnerships with other solution and product providers. Morelli (2006) describes PSS as a social construction which constructs on "attraction forces": shared vision, goals, expected results, and problem solving criteria to catalyze the participation of several partners to produce desirable scenario. The effectiveness of the co-produced value of PSS is based on a shared vision of possible and desirable scenarios. The study case in this thesis, the Iwo and care service production, includes different technologies and services joined together in order to fulfill a user's needs. Care service production (the value network) is the one to uses Iwo (technology) in order to complete certain tasks related to care services.

2.1.2. PSS Categories

Morelli (2003) explains that 'servitization' of products and 'productization' of services is evolving into a single offering which can be called as PSS, in other words PSS is in between a spectrum where on the other end the value is in products and on the other the value is in services. According to Tukker and Tischner (2004), the PSS can be divided into three main categories: product oriented, use oriented, result oriented. (Figure 2a)

In product oriented PSS the product dominates the sales, business model and offering, or value proposition. However, some consultancy and product related services can be offered in order to ensure efficient use, recycling, maintenance or viable financing to name a few. (Tukker & Tischner, 2004)

In use oriented PSS the product still has a central role, but instead of ownership, the customer purchases an access to a specific product(s) and services related to that. Responsibility on the product condition remains with the provider. Services such as rental services, car pooling and copying services where user pays for the use level or service unit can be described as use oriented PSS. (Tukker & Tischner, 2004)

In result oriented PSS the product or technology is not pre-determined, the provider and customer agrees on a result. The agreements include indicators to control the

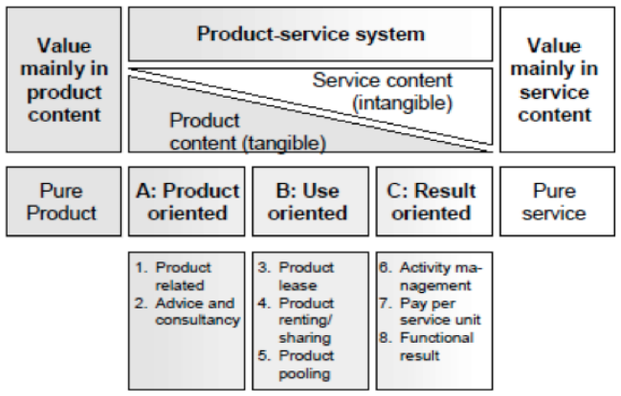


Figure 2A: Categorization of PSS (Tukker & Tischner, 2004)

quality, but the provider is free to deliver the result. Nevertheless, the way in which the result is delivered does not often differ from the conventional, so it seems to be more in the strategy the value proposition is put out into market. These types of services can be catering or cleaning services, or "companies who promise farmers a maximum harvest loss rather than selling pesticides." (Tukker & Tischner, 2004)
When looking at the care service production as a whole, there are numerous product service systems within each other which all can be oriented different ways. If one looks at the care service from end customers' point of view, it can be a result oriented system where the customer pays for safe and assisted living and receives certain level of care services. In some cases the customer pays also per service event, for example X euros

per one nurse call. In this scenario the Iwo is just a part of larger whole and is more likely to appear for the end customer as separate products which enable the caregivers to provide service on request. If one looks at the Iwo system from the service production point of view, it can be described as a use oriented system. In this case the care service unit pays for the implementation of the system and a monthly fee to Wiktio for the use, maintenance and repair of it. So far Wiktio has not built more service oriented business around Iwo.

2.1.3. Advantages of PSS

As PSS rises from sustainability exploration it can clearly have advantages in what comes to ecological aspects of offering. With integrated products and services, it is possible to create more value with less material (Matzen et al., 2005). These would be important to exclude, but in this case the interest is to find and point out advantages which would clearly be beneficial in the context of care service production which aims to deliver quality service for its end customers of today and tomorrow.

Tukker and Tischner (2004) lists several advantages compared to pure product sales which can be linked to the guiding factors of this thesis. Advantages such as potential for customization by services, re-distribution of activities in the value network ("so that each actor focuses best on its core competencies"), "'soft' aspects of a value proposition" (which can be innovated faster than hardware)" seem appealing if one looks at the end customer's needs in chapter 1.3.3. From the care service end customer requirements' point of view, the customization is clearly an advantage when proposing something for individuals with different lifestyles and needs. Also care service providers, the main customers of Iwo, among other actors are different, work in different facilities, in different organizations, in a different work culture, this requires customization as well. In PSS literature "most authors see the purpose of a PSS as a competitive proposition, so directly refer to the need for customer satisfaction and economic viability." (Baines et al., 2007) If the growing amount of elderly are to require and actively demand more individualized services in different forms (Kuusi, 2001), the PSS concepts could be potential in care service context in order to enhance the wellbeing of the end customer as well in reducing the price for society.

2.1.4. Examples of PSS strategies

A practical example of PSS is widely recognized Rolls-Royce jet engine 'Power by the Hour' concept has worked since 1980's. R-R's Idea is to give out the engine and make the airliner pay on the maintenance and other services which keep the engine

performing safely and economically through different situations, traffic peaks and seasons. (Prof. Jay Lee. 1.3.2012) (Baines et al., 2011)

A similar kind of example is Danfoss which produces components for refrigeration industry. Danfoss utilizes failure detection and monitoring in order to deliver energy optimization and reliability to refrigerator clients. (Matzen et al., 2005) Both of these examples work globally via networks. Where R-R manufactures the product and delivers the service by itself, Danfoss is a part of a network or alliance of companies and manufactures only some of the products' components. Still both can deliver value through service for their clients and sustain the cash flow over time.

KONE Deco™ has an interior decoration solution that covers not only the lift panels, but a full service from the planning of decoration to installation or replacement. This means that clients can easily order the replacement of the decoration. As such it is also an example of a product service system, or as Stickdorn & Schneider (2011) names it: a product service hybrid.

These examples clearly show how "any tangible product contains a large amount of service-value embedded." (Goedkoop et al., 1999) However, these examples seem very product centered yet in a context where the product itself is still necessary. An example that is closer to the world of individual users is Apple's iPod and iTunes package that combines the music and media store with a product. To develop such a combination means that the product concept and a service system need to be developed simultaneously. (Stickdorn & Schneider, 2011)

2.2. Products and Services

In most cases it is evident what a service is and what a product is. A service is usually defined as intangible, for example as an act which exists only in time, and a product as a tangible – object in time and space. However, with a closer look this separation gets more complex and blurred as technologies and automated systems are added. (Goedkoop et al., 1999)

A product can be defined as a tangible commodity and a service as an activity done for others. "Closer observation however shows a transitional area. This puts up the conclusion that a product and a service are to be regarded as two means for adding value (or function fulfilment)." (Goedkoop et al., 1999) "A service is an activity (work) done for others with an economic value and often done on a commercial basis." Work done by human beings as well as by automated systems can be considered as a service. (Goedkoop et al., 1999) "Because of their immaterial components, unlike products,

services cannot be stored, nor can their ownership be transferred, which happens when products are sold. Another relevant immaterial dimension in PSS is time: while products exist in time and space; services are processes which exist in time only." (Morelli 2002)

To be able to study a Product Service System, it is necessary to specify what a service is, what a product is and what kind of role those play in the system and what is the value those add.

Banking is a service, but to withdraw cash from ATM is a service too. On the other hand, a database is regarded as a product as well as the software with which you could access the database. (Goedkoop et al., 1999) Thus service in this context must be something that happens in between, automated information flow/exchange/processing. Even though it is characteristic to services that the production and consumption is simultaneous, data storing must be be a service too. It can be said that it is passive preservation that happens simultaneously as it is consumed or experienced.

"In PSS the production or operations organization will have a direct contact and involvement with the customer when creating and delivering the product offer." (Matzen et al., 2005) If care service production is looked at as PSS, it is evident that the direct contact and involvement with the end customer happens through the actions of caregivers and existence of the physical environment. For Wiktio and Iwo the care service provider is the main customer and user, so it would be important to build up the relationship during the design and implementation of the system.

In this thesis it is worth considering the Goedkoop et al. (1999) statement that service can be performed by human beings as well as automated systems. However, a piece of software is, also in this thesis, better to regard as a product.

2.2.1. Products and Services in this Thesis

Even though Iwo is a part of the care service production and a part of the constellation creating the value for the end customer, production and Iwo will be divided at this point in order to make it clear whose service is related to which products. Iwo consists of tangible products and intangible software, Wiktio's support services are built around them. The care service production system is much larger, consisting of the physical premises, various different appliances, devices and special furniture, services which cover some health and wellness services. With regard to care service production, only the most critical or interesting products and services relevant for this thesis will be categorized.

2.2.2. Products and Services of Iwo

If one takes a look at Iwo, it consists of tangible products such as different sensors, routers, locks, everything needed in a physical environment to sense and/or transfer data, to allow or to restrict certain things. Iwo software is also a product itself which users can exploit by using different devices, currently a mobile phone and a desktop computer. Services related to Iwo include customization, installation and support services. As in Goedkoop's definition, services are also the automated data storage, analytics and flows between different features and stakeholders in the entire care service production; services become visible in different products such as on a computer screen and in mobile devices. These more or less tangible and intangible elements and human performed services are connected and create a (Product-Service) system which again is connected to a care service system. A full list of current products and services from Wiktio's offering are listed in figure 2b.

The connections of different products create an ecosystem which enables information flow to and from user interfaces on mobile devices and computers. On the next spread figure 2c illustrates Iwo set-up at Mansikkapaikka care service center. In a traditional set-up (figure 2d) the personnel deal with multiple user interfaces in order to perform certain tasks and to read information related to the practical care work; in Iwo set-up the personnel would need to understand only one user interface and its logic. Since Iwo integrates different systems under one user interface, the amount of computers in a service unit can be reduced, this means that the organization does not need that much physical space. In the worst "traditional" case the care service organization buys a fire alarm system, an access control, a door phone system, a nurse call system, a patient information system etc. separately which means that the product supplier installs separate computers and devices into the unit. From the end customer's point of view the difference between Iwo and the so called traditional set-up is that in Iwo's case the service should appear as smoother as the personnel do not need to go from one place to another in order to see information related to customers' health for example in an emergency situation.

2.2.3. Products and Services for Care Service Customer

The end customers of care services are surrounded by the physical environment they live in, this must be one of the most critical elements that affect the wellbeing of the resident. This environment has several different functions such as bathrooms, a kitchen, a living room, premises for physiotherapy and so on. However, in this case the one that provides the technology has little to say about where and how the premises will be built. The care service environment is full of products which are a part of anybody's daily life as well, chairs, sofas, TV, tables, windows, lockers to name a few. These everyday objects can play a significant role in fulfilling the care service experience holistically although it can be a risk to provide such a household product for a person suffering from dementia. A bed with a bit of technology can enable the caregivers to move a disabled person more easily from it, or it can illustrate a sleep rhythm in order to enable e.g. preventive care. Some of relevant products and services for the end customer offered by a care service provider are listed in figure 2e. The list gives a view on touchpoints that both the end customer and in some cases the personnel deal with.

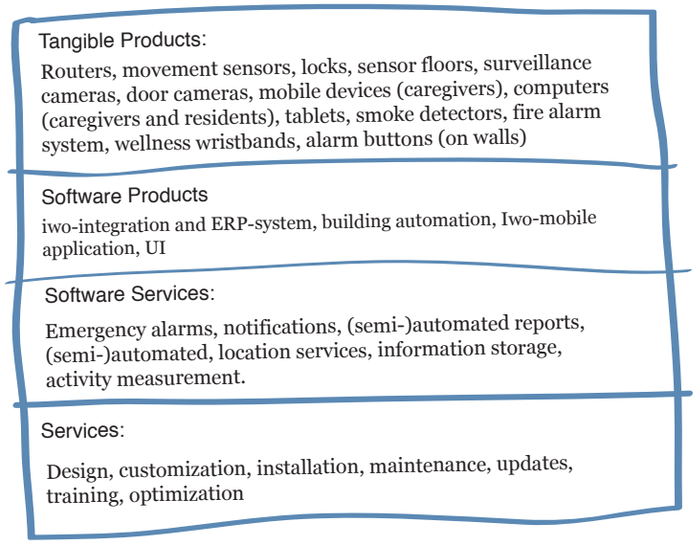
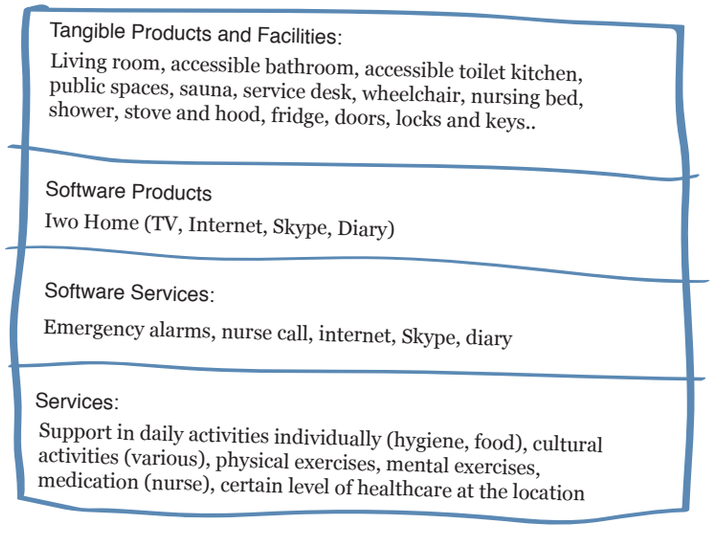
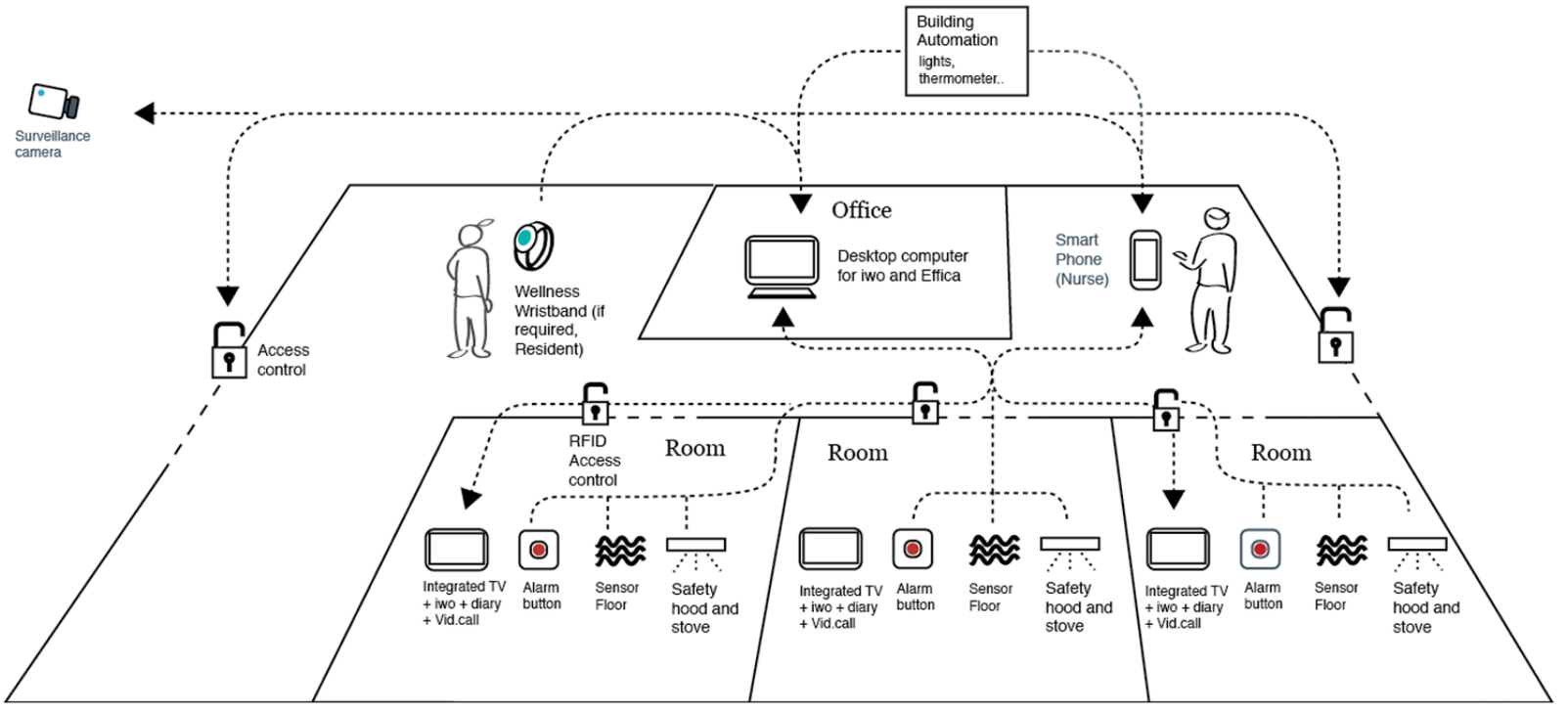


Figure 2b: Products and services offered by Wiktio

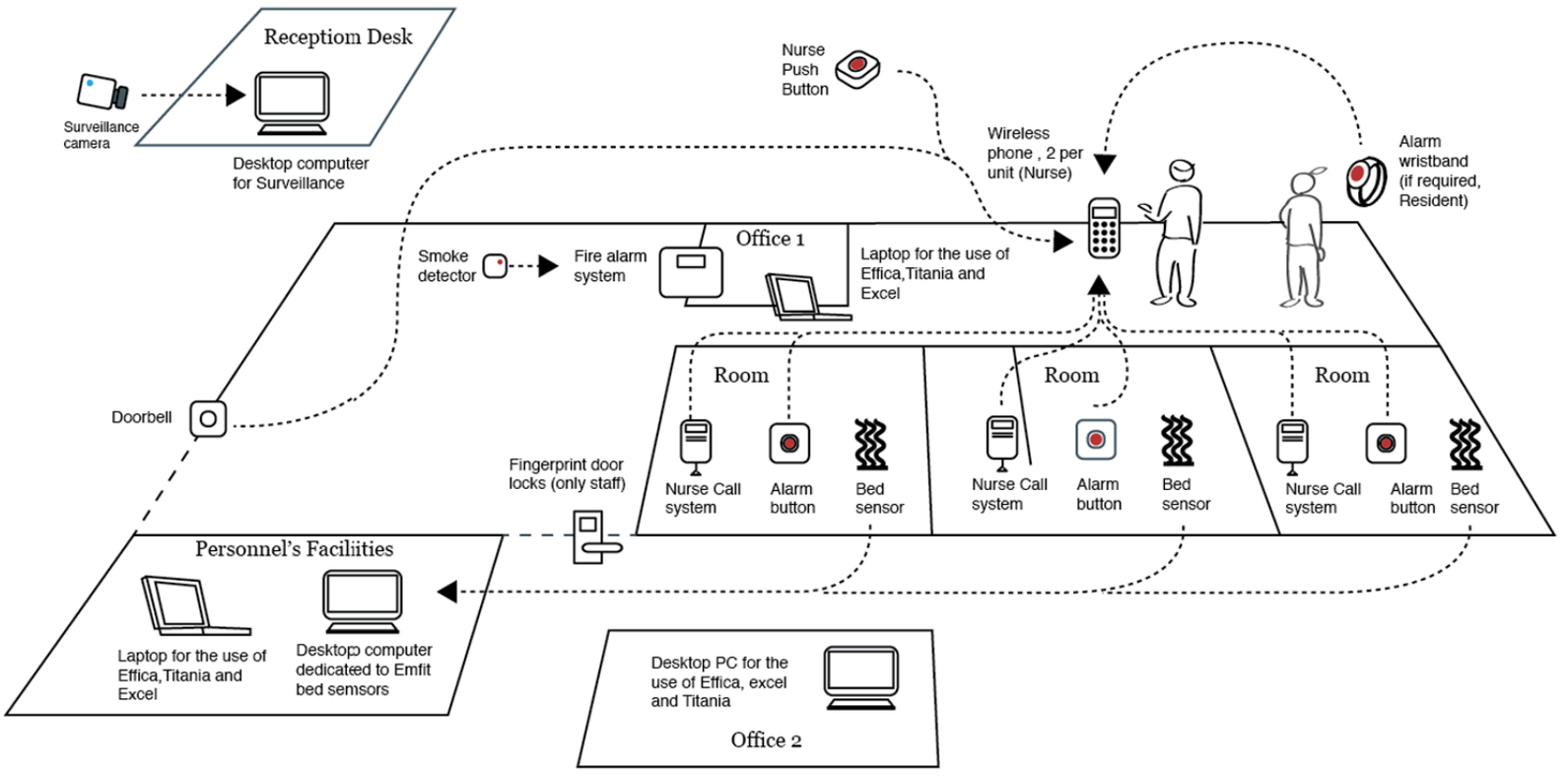
Figure 2e: Example of products and services offered for the resident by care service unit



Iwo set-up, Villa Jussoila, Rauma



“Traditional” set-up



2.3. Care Service Productions System and Actors

Care service units and the actors in the service production are subordinate to a larger service system. The larger system consists of municipal social services, supervising authorities and other social and health services that again are subordinate to the Finnish Ministry of Health and Social Affairs. In this thesis I do not focus on the whole care service system, but I will acknowledge that such a system exists and it makes public care services possible, and that it does to some extent control how services are produced and supervised. Figure 2f illustrates actors of involved in care service system.

In Finland the Ministry of Health and Social Affairs obligate municipalities to provide a set of health and social services aimed at the elderly. Municipalities produce the services by themselves or buy the services from other municipalities or from private service providers. Services are granted for the elderly on the basis of an individual service needs assessment. (www.stm.fi 2012)

STM (www.stm.fi, 2012) lists e.g. the following services aimed at the elderly:

- Prevention services

- Senior Info, home visits, day centres, and vaccinations
- Health services
- Physical examinations, dental care, home nursing, rehabilitation services and assistive devices
- Housing services
- Housing is supported by housing services by granting reimbursements for housing renovation work and by providing service accommodation
- Institutional care
- If home or living in care service unit has become impossible, care can be organised in the form of institutional care
- Informal care
- Municipalities can grant informal care support for a relative or friend of a person being cared for
- Memory rehabilitation
- Social and health care professionals offer guidance and advice for people with memory disorders

As explained earlier, the quality of these services are supervised and instructed by the National Supervisory Authority for Welfare and Health (Valvira) and the National Institute for Health and Welfare (THL). (www.stm.fi, 2012) The latter produces also information on older people's services and functional capacity and conditions. Valvira is split into smaller regional offices. (www.stm.fi, 2012) These actors may seem distant from the end customer point of view as well as from the actual care work point of view.

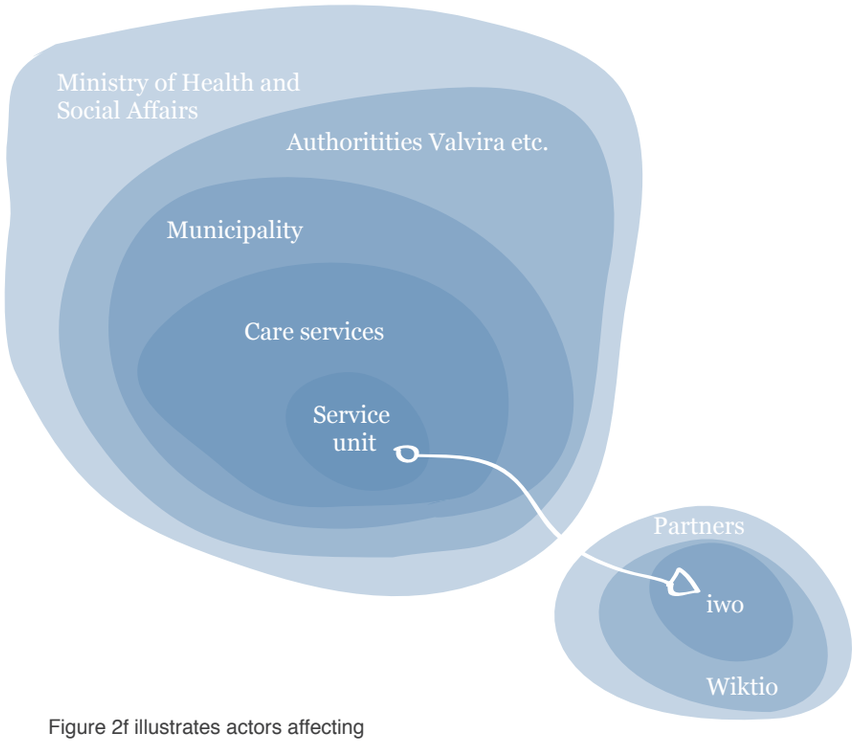
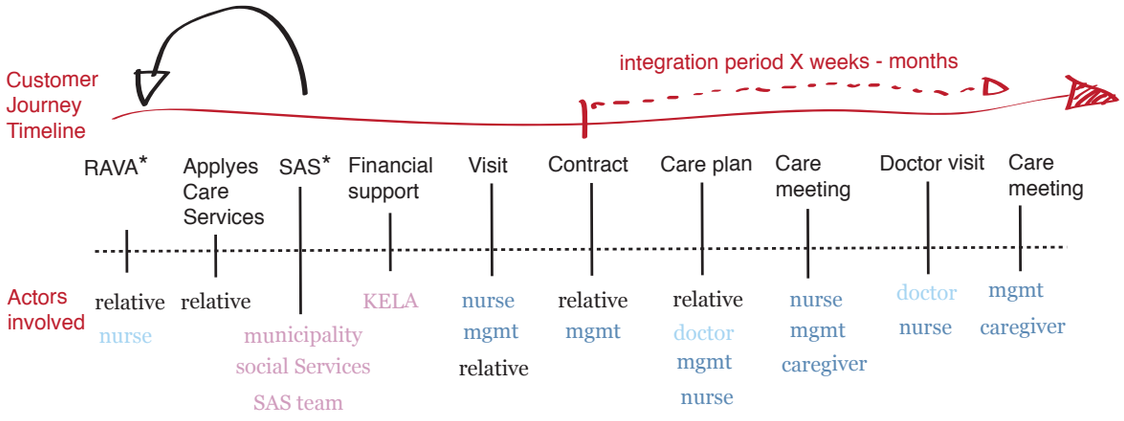


Figure 2f illustrates actors affecting the care service production and Iwo's position.

In order to get a grant to a care service, the person (and often their relatives) need to go through a process in which the person's condition and abilities are assessed. Figure 2g illustrates an example of this process of different phases and assessments that a person may need to go through and the actors involved in. It also shows phases that take place after the person receives a place at care service unit. In this form, the process seems burdensome and long. A lot of information will be gathered by different actors, but one can wonder where it all ends up and in what form? Some parts of the information are on papers and some in the depths of patient information systems that are used by professionals.

Figure 2g: an example of steps an old person needs to go through in order to get care service place

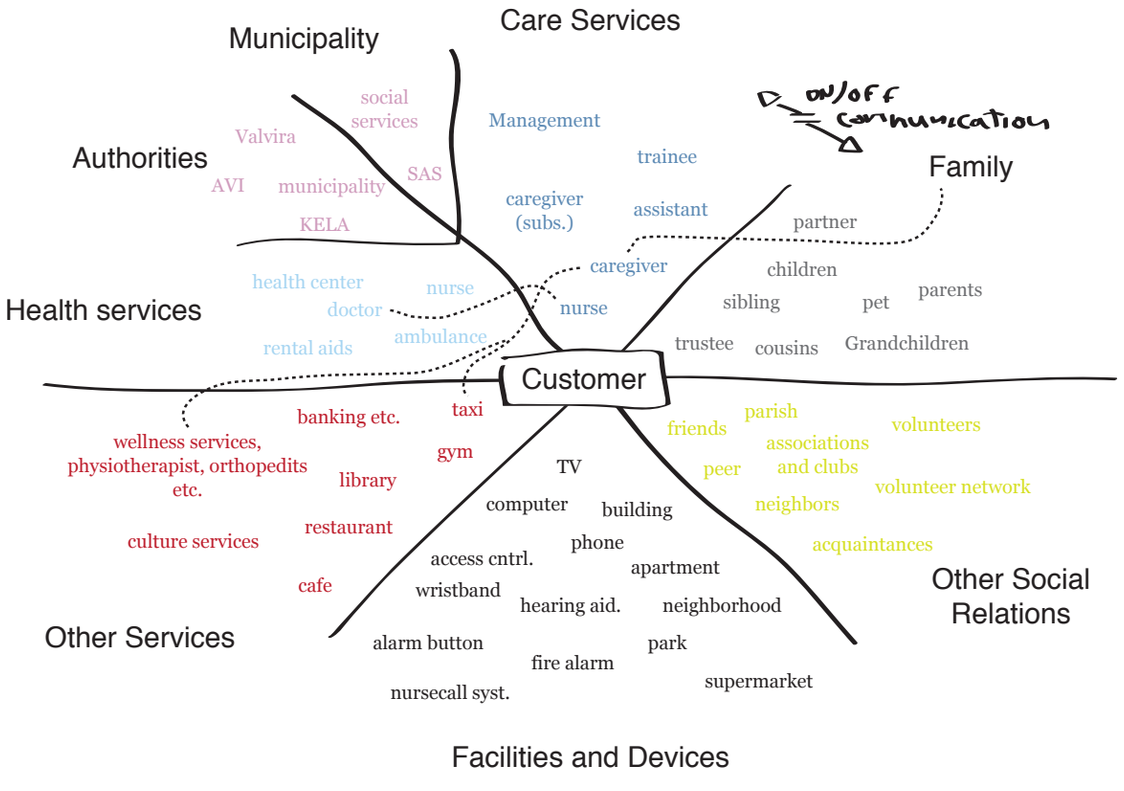


* RAVA is a meter for assessment of older people's functional capacity and need for help

SAS (Plan, Evaluate, Place) is a multi-professional team which deals with the applications

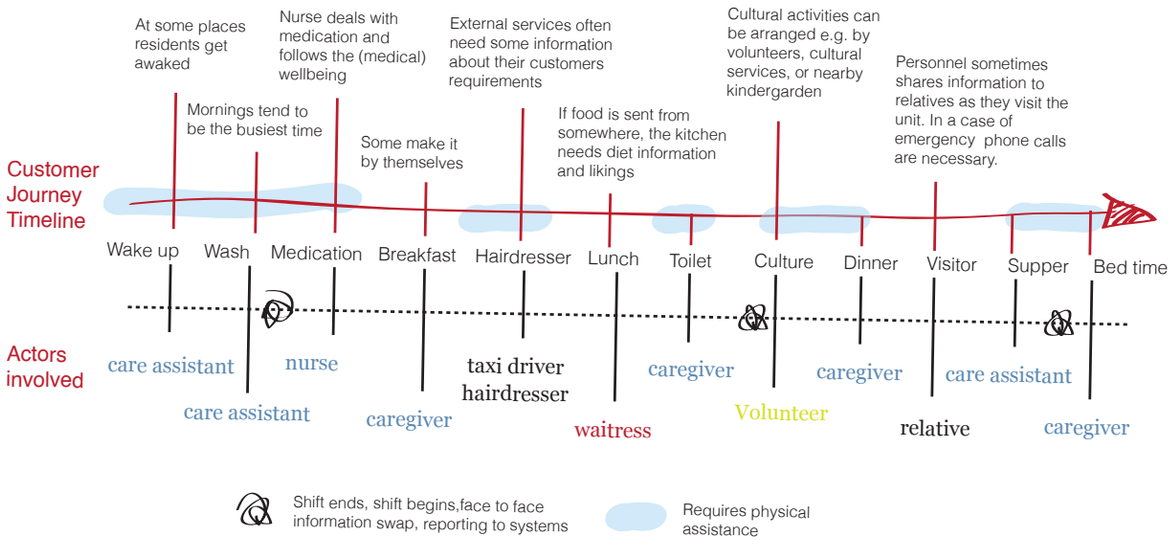
The end customer in care services is surrounded by many actors that indirectly or directly contribute to his or her wellbeing. Some of these actors are clearly organized and performance driven actors, for example commercially organized care services. End customers are often also surrounded by their relatives or close ones that may be more or less organized in taking care of one. There are also actors who do play a role in different activities (even daily) that are not driven by an occupational responsibility; these actors can be neighbors or volunteers. Also more or less occasional services and service personnel may have a role on an elderly or disabled person's daily life, these can be for example a familiar taxi driver, a physiotherapist, a librarian, basically a person who is becoming familiar over some period of time in a person's active environment. These actors that are among the previously discussed ones are presented in figure 2h and their relational connections are brought up. The network map includes also facilities and devices that make the care service possible and contribute to the wellbeing, or work as a mediator between different actors.

Figure 2h: an example of different actors that surround an old person or disabled in need of care services



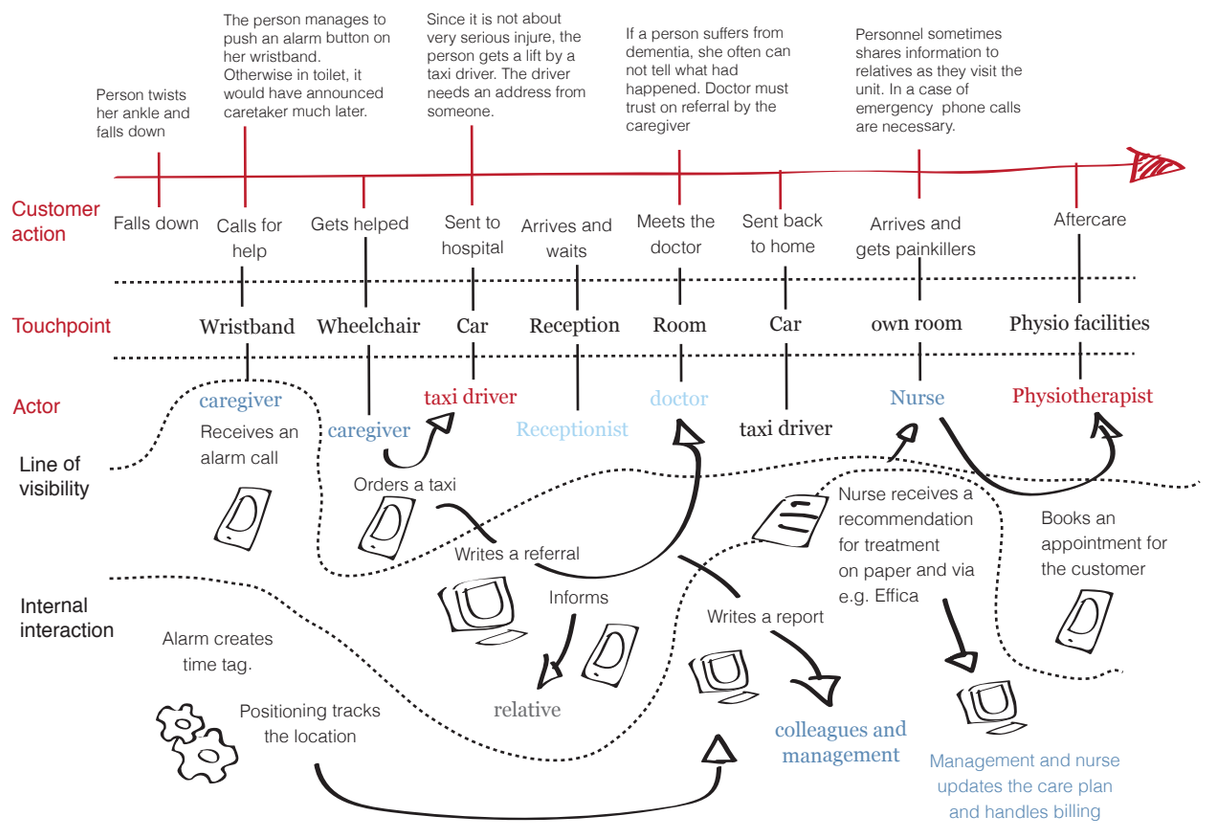
The actors that have been involved in the application phase differ from the ones that get involved with the customer on a daily basis. Figure 2i illustrates an example of a day in a care service unit. A day in different service units must vary since the people, service culture, embedded services, the customer's abilities can be very different. However, as illustrated below during twenty four hours a customer can get involved with five different care workers, a cafeteria worker, a taxi driver, a hairdresser, a volunteer cultural worker, etc. The figure excludes other customer, peers who also contribute to the overall experience in the care service unit. Anyhow, this does not mean that the care quality or time spent with the customer would be on a desired level from the customer's point of view.

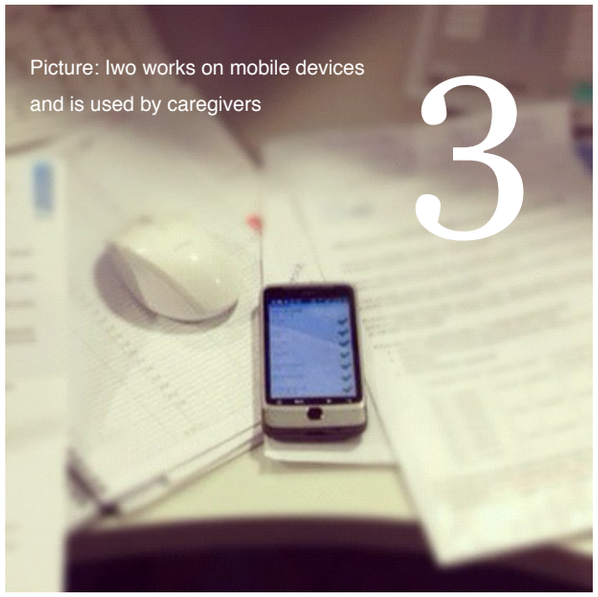
Figure 2i: an example of a day in a care service unit



An emergency situation (Figure 2j) reveals another set of actors. As this type of situation is related to one of the main features, the nurse call, of Iwo so the touchpoints and service personnel's actions are also explained in the illustration. In the case of an immediate need of assistance, which can happen at any time of the day, a caregiver needs skills to help, handle, and medicate a person individually. Different actors, care service personnel, even different institutions then need to share different information via different medias.

Figure 2j: an example of an emergency situation




Picture: Iwo works on mobile devices
and is used by caregivers
3

Role and Challenges of Technology in Care Service Production

This chapter answers the question of technology's role in care service production and explains the key findings of the research. It also looks at the challenges that came up during the research and observation phase. The chapter ends with a summary of identified development opportunities that the concepts in chapter 5 seek to respond to.

3.1. Role of Technology in Care Service Production

As described in the previous chapter, the care service production deals with many different technological platforms. Some of the platforms are purely information based software systems such as patient information system, billing software and human resource management system in addition to e-mail, calendars and so on. Technologies get more tangible when looking at the practical care work. Often these technologies can be categorized as health and wellness technologies.

Technology is a part of vast and complex whole, in this case a care service production system. If one part of the care service system changes, it affects directly or indirectly other parts of the system as well (Raappana & Melkas, 2009). Raappana & Melkas (2009) divides the technologies within care services according to the objectives. The role of technology can be: problem prevention, emphasizing and exploitation of strengths, compensation of deteriorating abilities, to support care work. The objectives of technology are perceived to be for the maintenance of health, for the support for individuality, for comfort and to retain one's independence as well as participation and inclusion, and also for stimulus and physical activity. In the health care sector technology has had a role in enhancing monitoring, reduction of medication errors, and it has also decreased the rate of inappropriate care (Chaudhry et al., 2006). In other words, it is proven that technology can also play a role in supporting the quality of a care event.

According to the CEO of a care service company, the management needs to ensure that the caregivers fulfill the requirements of service. Since individual customers' service needs can vary measurably, there are no clear standard tasks to be fulfilled. In addition, to be able to assess the quality, the management needs qualitative information at least from caregivers, quantitative is not enough. The care service company whose representative was interviewed runs four care service units. There are pieces of software with which they are able to record the qualitative data of their operation, this data is typed by caregivers on computers. Other pieces of software in their premises are used for billing, human resource management, scheduling, customer information. To some extent, some of these software solutions are also used by caregivers and nurses. The operational usage is about keeping a record and sharing information of events related to end customers' condition and services. The caregiver does need to deal also with alarm systems, which in the units are delivered by different system providers. These systems are not integrated anyhow into the above mentioned software systems but work as a separate systems. (Interview: the CEO of a care service company)

It can be argued through the studies and observations that the role of technology within the care service context is mainly to work as a guiding medium as well as an information provider for the caregiver whose role is to utilize the existing information and signals in order to provide quality care. Technology alone cannot guarantee quality care, thus it is important that the service organization has the culture and procedures which enables the personnel to utilize the technology and also to build up collective understanding about end customers.

The role of current Iwo system will be described more thoroughly later in this chapter. However, to be able to develop the system, it is appropriate to look at the clear challenges related to technology and services.

3.2. Challenges of technology in Care Service Production

When the organization deals with multiple technologies, there is a substantial amount of challenges to overcome in many levels of the care service organization. Challenges also appear over long periods of time, the earliest ones at the bidding process and at the design phase, and later in the care service operation. Thus, I would divide the challenges into two main categories that are on the way of fulfilling the wellbeing needs of the end customers in care services: challenges in the implementation of technology and challenges in the operation with technology.

3.2.1. Challenges in the Implementation

There are no universal solutions that every care service organization would need, that is why there is always design work and customization process to be executed. This can create major challenges at an early stage that the technology providers face. The earliest ones are related to decision makers' overall understanding about the required technologies. Often there is lack of understanding about what the context of the used technology is and what it is used for. To increase the understanding, it would require communication between different actors involved in the implementation as well as in the care service production. (Raappana & Melkas, 2009) It is possible that some of the problems the caregivers will face with the technology are caused already in the (municipal and private) bidding and decision making process. However, the design and implementation phase of care technologies for some service units has also many challenges to tackle.

The care service units which have the Iwo system are established within few years. Mansikkapaikka in Rauma, is a good example of a unit which was designed, built, and has been in function for over a year and has settled the operations. Currently the technology works, and there are no problems that would hinder the care work. However, there have been technical issues to be solved in the implementation process. For example 3G network has not worked inside the building as expected which seem to be common new low energy buildings (www.yle.fi, 2012). This type of issues require communication between different actors who are involved in for example the construction process of the care service unit. In the implementation of Wiktio's system there are many companies involved in the design and implementation, in such an approach,

problems will appear if the communication is not accurate enough. However, most likely it is that the problems appear as the care service unit is put into operation. The time when the service unit is put into operation is critical in many ways. It is the time when the personnel get trained to use the technologies, meaning that the personnel do not fully know how to use nor understand the system. It also is the time when the technical issues will appear if testing has not covered all possible situations. As these overlap, one can imagine it is frustrating for all the actors, especially the caregivers. If the end customers are brought too early into the unit, they will also be affected by the hassle around technical difficulties.

3.2.2. Challenges in operation

Only the technology which is in a right place at a right time enhances service effectiveness and efficiency as well as ensures quality services. Wrong kind of technology, inadequate technology, or too much technology disturbs work processes and can cause decrease of work motivation. (Raappana & Melkas, 2009) Observations in care service units and interviews made with the personnel during this thesis work are in favor of the former view. The personnel working at care services seem reasonably more oriented towards the practical care work and socializing rather than being interested about computers and gadgets. Probably this is one reason why minor problems from the designer and engineer point of view creates major confusion and frustration that breaks the workflow among the care service personnel. Maintaining the workflow as well as possible is one clear challenge to overcome.

The care service personnel tend to transit between different service units which all have different technologies to be used; this adds up a substantial amount of complexity for the personnel to deal with. This means, that if the usability is not easy enough for the new caregivers, there is every time the learning phase and presumably frustration in the air during the first shifts. Since every technology requires some learning, the new caregiver at the service unit has to be taught, which is done by a fellow caregiver. Is there a right way to teach the technology? Since each unit has a bit different working culture and the way to use the technology, probably the "right" peer-to-peer training method will develop over time in each service unit.

Observations showed that the main issues that create confusion in practical care work relate to the user interface of Iwo, products that are not simple or smart enough and reliability of technology in early phase. For example 3G network has not worked inside the building as expected which seem to be common new low energy buildings (www.yle.fi, 2012). By the products that are not smart enough it is referred to observation related to a sensor floor at one unit. The sensor floor in a resident's room sends an

alarm to caregivers if a person for example falls on the floor. However, the technology is not accurate enough to understand whether there is actually a person lying or two people standing next to each other, therefore it sends faulty alarms in many situations. To overcome this issue, the sensor floor can be turned off by pushing a button on the wall. This again creates a problem as people do not remember to turn the floor off or on every time they visit the resident. This type of arrangement governs the caregiver to go through certain procedure to be able to perform the actual care work. When the floor works properly, like many times it does, it is seen as a very helpful system. Other issues that also create unnecessary procedures are related to the Iwo interface and to the security of information. By referring to the observations, the UI includes for example too many security levels from the workflow point of view. Again the personnel need to remember certain codes and numbers to get to the actual work. Without going too deeply into this discussion, it can be argued that getting rid of or the re-arrangement of the extensive security would help to maintain a caregiver's motivation and workflow which presumably can enhance the focus on the service.

All in all Iwo's usability, especially on mobile touch screen devices, is not on the level it should be for people who are used to use the very basic mobile phones. The observations showed that caregivers did not feel comfortable with graphical UI that require different operational logic than a device with tangible buttons. Iwo's mobile UI has for example a hidden menu which needs to be swiped with a finger from the top of the screen. This feature is sometimes hard to remember even for more experienced users. The UI has also many empty text slots that are unused in most of the care service units in which it is installed, the main reason for this is that personnel may use some other patient information system as a diary and a reporting system. This makes Iwo look very insubstantial, therefore meaningless. If Iwo would be more specific, a system without all the unused excessive reporting options, it would be easier to understand and therefore easier to use. On the other hand, if the care service organizations started using Iwo for recording the useful information (as in Mansikkapaikka's unit for the disabled) the system would give more substance to the work, and it would make the sharing of information within the personnel easier.

However, there would still be work to do since difficult usability can weaken the work motivation and moral. How the users experience the technology is based on earlier life and experience with technology. Users will never adopt the technology if it is experienced to be complex, confusing or disturbing from their point of view. (Saariluoma et al., 2010)

3.3. Role of Iwo in Care Service Production

Iwo system combines several products and sub-systems, that is why the role of it is rather manifold. The system is mainly used by caregivers, care service management, residents but it could also be customized for residents' relatives or intimates. As stated earlier, the thesis focuses on the role of Iwo for care service workers but to some extent it still considers other actors as well.

The tangible products included in the system are mostly objects that mediate and sense the information. The only objects that are touched are push buttons, sensor door locks (and badges), a stove and a faucet, a wellness wristband, a computer and mobile devices. Other products are sensors, such as smoke detectors, and actuators hidden somewhere in the structure of care service premises, evidently these products are only to mediate the data closer to care service personnel (and residents). Thus, the tangible products' roles are to sense, to send, to receive information and actuate certain tasks according to the nature of the data. However, in a case of computers and mobile devices the role is also to display the data and enable it to be used.

The software product is the element in the system that transform the data into information and thus useful for the personnel. The user interface displays the information and allows the user to view, edit, and share it as well as to create it. The user interface appears currently on mobile devices and on computers, on products which enable the above mentioned functions. The content, the information, the caregivers deal with is the crucial element which guides them to act for and serve the end customer in a certain way. The information empowers the caregivers to take action. Thereby the main role of the software is to translate the data into information that is useful for the caregivers.

The information guides caregivers to go and assist the resident in a moment. For example alarms and notifications can tell where assistance is needed or if a resident suffering from dementia is about to leave the building. Information set to be "notification" is apparently for keeping the caregivers aware what is happening in their premises. Alarms mean serious need for assistance or even an accident, such as dropping out of bed. However, information can also guide the personnel to enhance the rehabilitative approach and preventive care. This type of information requires data from a long period of time and it can for example be related to an activity or sleep quality.

Thus the information, the content, has the most important role also in the Iwo system. The information relates to an actor's activities, and the most important activities are to provide individual assistance, provide help in case of an unfortunate event, to provide preventive and rehabilitative approach in care.

Iwo's features and roles in care service production summarized as follows (if fully utilized):

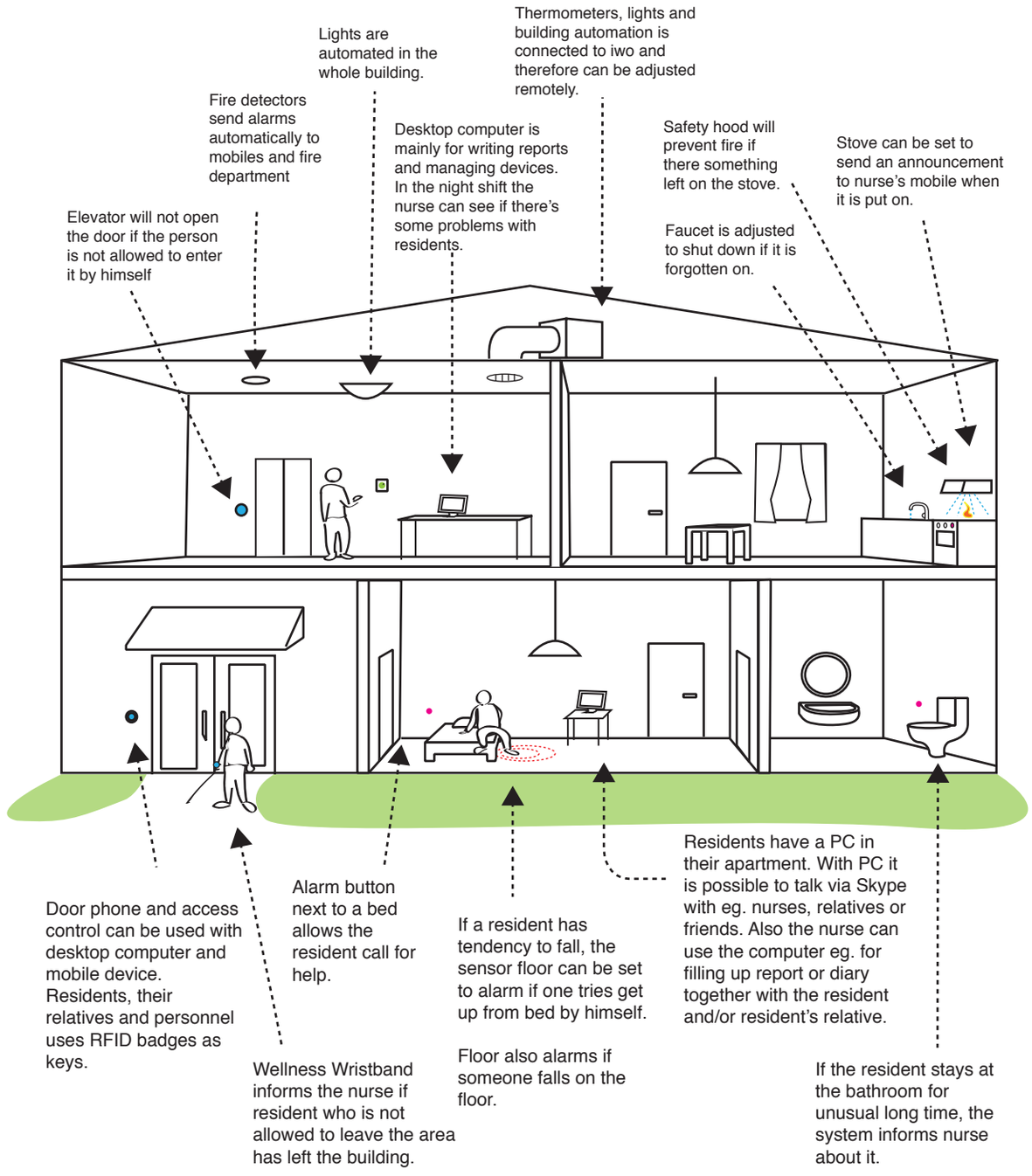
Iwo's role in care service management:
- Main: Billing, patient information, shift planning
- Secondary: Patient information, activity and wellbeing monitoring, diary

Iwo's role for a nurse:
- Main: Patient information, alarms, activity and wellbeing monitoring, diary

Iwo's role for a caregiver:
- Main: Alarms, nurse call, notifications
- Secondary: Patient information, activity and wellbeing monitoring, diary

Iwo's role for an end customer:
- Main: Nurse call, communication system
- Secondary: Television, games, internet

The figure 3a: situations and functions related to the Iwo system.



Picture: Care service unit Lotte,
Copenhagen, Denmark

4

Future Prospects in Care Services

Picture: Residents preparing food, Herfra til Evigheden -community, Roskilde, Denmark

The previous chapters identified actors and looked at the role of technology in care service production. Before going to findings and proposals, there are aspects that may have impact on the future care service production and it's environment. To understand these aspects helps in finging the right basis for the concept design (Keinonen & Jääskö, 2004). This chapter's purpose is to present indicated aspects and open up the thinking behind the upcoming concept proposals. The purpose is also to sensitize and to inspire the concept design process of Iwo as a part of care services but also to reveal for the reader some aspects outside the core data collection which may influence design decisions. This chapter includes examples which are not researched too critically nor thought too thoroughly. However, these may provide solutions or platforms for solutions in the near future.

The research prompted many questions that lead to look at aspects also outside care services. Do people really need the massive and bureaucratic care service system? Do people want to live under multinational care service brands? (This relates to the privatization of care services) Do people want to be treated in a sterile, institutionalized environment if they only get slower? Do people want to pay to get social interaction? Do people want to eat the same institutional food everyday if they lose the ability to say their opinion about it? Maybe not. But many times there is no option. Even the new "well designed" care service units visited during the research are not that encouraging examples. The most pleasant care service environment experience for me has so far been the visit at Ok-Hjemmet Lotte in Copenhagen. At Lotte the technology hardly played any role in the service, even the building itself is from the 19th century and would not fulfill any standard requirements as a modern care service unit. Lotte felt like a home and it was not all because of worn out floors and walls, cat flap on the door, an open kitchen door. It felt like a "place to be" because of the free spirit the caregivers and the residents had, the culture and the way of being together (and the possibility to add as much salt as a ninety-year-old resident wants to.) After the visit at Lotte, life in other care service units seemed very medicalized, instructed, they seemed like places where the residents are kept clean and billed until they pass away. Even though at Lotte the computer was kept in a basement, it can be wondered could the technology somehow nourish the kind of positive free spirit and change the observed Finnish service culture?

The future of care services depends on many variables. During 2012 the Finnish government has constantly discussed about the fact whether the law should determine a minimum amount of caregivers in order to ensure "quality" care. How this type of change will affect the services in practice is unknown. But I would suggest, it would not radically change the current paradigm; basically it would mean more caregivers per customer, less workload per caregiver, and more time for customers (in theory). Economically, this of course rises the expenses of care services. Other arrangement that would affect the care service paradigm is the use of service vouchers. This means that people are granted a monthly voucher to spend on services they value. The idea of the voucher is to promote a freedom of choice. (www.stm.fi) Probably the voucher would change the care service market into a customer oriented activity. A 'personal budget' appears to be a similar type of arrangement. A personal budget gives the possibility to choose that kind services that help one to live independently and as a plenipotentiary member of society. The personal budget aims also to acknowledge cultural services as a promoter of well-being. (Juntunen et al. 2012) These can translate into concrete improvements in care service offering in the long run, but how? And how the elderly or disabled find the services they might like? It is also interesting how for example cities envision the future of services and the way they plan to enhance the wellbeing. There are also, not visions, but signals and change in consumption and production of other products and services that inspire the design phase.

4.1. Visions and Approaches in Care Services

The City of Helsinki wants to support an elderly person's individuality and to provide a diverse set of services (Vision: Omannäköinen vanhuus). According to Timo Vierelä, a planner at 'Services for the Elderly in Helsinki', Helsinki will combine social services and elderly services in order to anticipate the care service need more effectively and individually. Basically, that social service workers would deal more closely with people who work in as well as are (or will become) customers in home care, day care, interval care. Clearly this is a benefit for people who are at a risk of falling out from the social safety net and builds up the tacit knowledge of people (individuals) in need of e.g. care services. This approach requires new organizational construction and physical premises as well as technological solutions. (Interview, Vierelä)

In City of Vantaa's vision ("Vantaa vanhenee viisaasti"), the elderly are a source of richness, they have a substantial amount of accumulated experience and wisdom that should be appreciated and utilized. In Vantaa older people will live meaningful life. In order to fulfill this vision Vantaa lists six service promises that guide the enhancement of wellbeing of the elderly. Among these promises there are mentions about participation, accessibility, positive attitude. The emphasis on preventive health and self-care services, as well as on people as members of information society comes closest to this thesis point of view. (www.vantaa.fi, 2012) The approach seems to encourage the elderly to stay at home as long as possible, and it will be made possible by providing an array of concrete solutions as well as mental models and approaches. The latter is also worthwhile to remember in the development of technology, since I believe it could guide a caregiver to see the customer as an individual. Vantaa's vision acknowledges the elderly as full-fledged citizens. However, I must point out that this also stresses the elderly to stay in their homes longer than they probably should, and it may make the integration into a care home difficult.

4.2. Signals Potentially Affecting Care Services

Signals from consumption and production suggest a shift from a top down value chain to a horizontal value constellation where the value is "coproduced by different actors, including producers, service providers, local institutions, and individual users." (Morelli, 2011). Horizontal constellations allow an exchange of resources "such as tacit knowledge, mutual understanding, and solidarity, which cannot be codified, institutionalized, or prescribed." (Morelli, 2011) It could be described that people living in care service units are in the middle of an above-described constellation. However, I would suggest that full potential of such a constellation may easily be unused due

to a lack of culture and communication or an operator or too strong hierarchy. Also frequently changing personnel does not help in forming such a constellation with a mutual understanding. Tuorila (2011) states that today's care services are planned for masses. Resources, hurry and emphasis on productivity gives no place for individual care. Yet, the current welfare system focuses on taking care of very specific issues; caring about people's lives holistically is not under anybody's focus. "Do it yourself " care services are becoming more common. In them people take the responsibility of their own health and coping. I find that in this development different kind of communities are becoming more important support in people's lives.

In the future, society will build more and more on communities where individuals will have the voice, and the sense of belonging and participation. In this type of society, well-being is developed and reshaped by citizens, not technology nor polity even though both are needed in enabling the development. (Mokka & Neuvonen, 2006) A housing community called "Herfra til Evigheden" (From Here to Eternity) in Roskilde, Denmark, is an example of the above described phenomena. In Roskilde, a group of senior citizens decided to build up a community where they could support each other till the end of their lives. To make it work the community needed to build up mutual understanding as well as to establish rules. Residents share tools and parts of the physical premises, but they also share time for example while preparing food to each other on certain days of the week. (Visit/excursion, Roskilde, 2012) As Mokka & Neuvonen (2006) puts it in describing a similar housing community called Loppukiri in Arabia, Helsinki: The purpose of cooking is not only to feed the residents but also to strengthen the social network which is one prerequisite for happiness and well-being. In this case the technology indeed did not have much to do except enabling a certain way of being together.

It could be argued that a similar type of trend of co-production can be seen also in other layers of society not just among seniors. It can be seen in services that are (also occasionally) produced or co-produced by citizens. In Finland service such as Sharetribe (https://www.sharetribe.com/fi), Kuinoma (http://www.kuinoma.fi/) and Stadin Aikapankki (http://stadinaikapankki.wordpress.com) where people can borrow products or swap favors, or Restaurant Day event (http://www.restaurantday.org/) when anyone open a restaurant for a day are a few examples of co-produced (or peer-to-peer, or DIY) services. Globally known example is Airbnb, a peer-to-peer marketplace for people to rent apartments. (https://www.airbnb.com) These examples can be also called as 'collaborative consumption' which has become possible because technological development has "increased efficiency and social glue of trust to make sharing easier and easier" (http://www.rachelbotsman.com). In this thesis context the trustworthiness is one element which is important to keep in mind. Especially when linking the volunteers with people who are not necessarily fully aware of everything.

An interesting observation is also however expanding social network services such as Facebook beginning to contain embedded social networks and even applications that serve a specific community. LiveFamily (www.livefamily.com) is an example of a built-in social application inside Facebook which is aimed at families; it contains calendars, closed photo galleries and other tools to manage information that a family does not want to share.

In neighborhood democracy projects people work together in order to save on costs or to create a more pleasant environment. (http://ilmastoinfo.fi/kortteli/) When it comes to care services, volunteer work is seen as an important resource in elderly care (http://www.valli.fi/) and municipalities will also need to rely more on volunteer networks as the dependency ratio rises. (Interview, Vierelä)

These activities may be on the extreme from the PSS business point of view, but they could be named as signals which should be considered in the development of care service technologies as well. To provide an open platform for communal care service production would be an interesting experiment. However, I still believe that professional assistance will always be required in some cases. Services such as Doctagon's house doctor who makes home visits (http://www.doctagon.fi) is an example of a service which makes health care at least physically more accessible (if not financially).Since new affordable health technologies further the possibility to rely on self-care (Tuorila, 2011), a combination of products and a professional human performed service begins to sound a plausible prospect. In the care service context and an interesting concept is the Home Instead care service which gathers a network of people who are motivated to help and assist. In the concept the caregiver does not need to have previous education nor work experience, motivation to help is enough, the training is offered by Home Instead. (http://www.homeinstead.fi/) For people who have the will and time, this gives an opportunity to help others flexibly.

These aspects, thoughts and examples that are not clearly derived from the actual data collection and observations, may have an impact on the concept proposals to support Wiktio's development of technology.

5

Picture: Findings were arranged under different themes

Findings and Discussion

Picture: Some of the notes made during the contextual interview

This chapter underlines the role of technology and Iwo from the care service production point of view, but also summarizes the key findings and issues that came up during the exploration process.

Care services and housing for the elderly and disabled in Finland are arranged by municipalities or private care service providers. Services take place in care service centers, home environment or in dedicated housing for the disabled or elderly. These services are produced by professional personnel whose education is most likely in healthcare. In order to carry out the service, to provide security and life quality, to maintain and generate up to date customer information there and so on, there is set of different technologies that aim to ease up the process.

5.1. Role of Technology

As Raappana & Melkas (2009) state the role of technology within care services can be problem prevention, to emphasize and to exploit of one's strengths, to compensate for deteriorating abilities, to support care work. The objective this thesis study regarding Iwo's role is clearly to support care work. Still, it has multiple touchpoints and functionalities for care service personnel from managers to care assistants, thus it is difficult to make any clearer statement of its role in care service production.
It can enable smoother access through service premises, by utilizing sensor lock technology. It can ease up the workload by locking the doors and dimming the lights automatically. It can enable the management of work load in form of shift planning. It can also make the environment cozier since the technology can be hidden into structures and so on. All these aspects contribute to and enable the way the service production can be performed, more efficiently more fluently (and logically thinking it should give more time and space for the servants to focus on what is important for the customer's wellbeing holistically). However, these types of roles are further in the background and indeed to support the actual care work which is about fulfilling and maintaining the basic human needs of the elderly or disabled (Yura & Walsh, 1983). When the technology works it can help the care service in fulfilling a customer's very basic physical needs on demand and quicker. Is efficacy enough? Is it the key to wellbeing in the context of care services and living? What if the technology is desired to help the caregivers to address more the holistic wellbeing of the elderly or disabled living in care services, what does it need to do? How does it help the personnel to address individual needs? What is the role of technology then? What could be the core of Iwo from the care service personnel's point of view?

The observations, interviews and understanding gained during this study suggest that in the context of this thesis it is the information which could have positive impact on the end customers' wellbeing on the spot and in the long run. It is also proven in the field of healthcare that information technologies improves the quality and efficiency of the service (Chaudhry et al., 2006). What information and the way in which it is brought visible to different actors in different situations could build up a collective understanding on what are the best ways to fulfill the end customers' needs. The technology cannot hug anyone, it cannot put the sugar into a coffee cup (robots excluded), in social situations it cannot act the way that is comfortable for all, it cannot crack a joke spontaneously at right time. After all "..information technologies are tools that support the delivery of care—they do not, in and of themselves, alter states of disease or of health (Chaudhry et al., 2006)." Technology, or more accurately the information that the technology delivers could guide and help the actors in care services to get to know the customers and notice changes on them quicker by emphasizing different aspects on them. This is important, because the

personnel changes often. For example in so called ‘normal life’ where most people can manage one’s social network, people are self-motivated to learn each other and from each other, to understand how to act and to be with others. In care service unit environments this can be often nearly impossible, both for the customer and for the personnel and that is the reason why effective information and sharing of it is important. The quicker the caregivers learn where the customers come from, what they stand for, what their condition is, how they are treated, the quicker there must build up a true understanding that translates into true appreciation for the end customer.

Since Iwo technology is integrated into the care environment and into the care work and it has multiple touchpoints it can add value to the service process. In fact, if Iwo would be fully utilized in care service production the main roles of it would be to work as a database and information mediator. Iwo compiles, automatically and manually, critical information about end customers’ to be utilized by the care service organization in the right place at the right time. It brings the information in form of alarms, health data and personal information on computer and mobile device screens. Some information will be pre-filled by personnel as the customers enter the service unit, other information is generated over time by the service personnel but also by sensors and actuators.

5.1.2. Issues

However, the aspects that inhibit the effective usage are manifold and related to each other. There are challenges in the training of the care service personnel so that they would be able and engaged to use Iwo system effectively; on the other hand, the user interface may have some basic flaws that disengage the user from using it. Observations and interviews proved that features such as alarms, video calls, diary and basic customer information, that could be utilized daily in different situation are not understood totally, in turn one can question whether those are necessary. This issue can be derived from aspects in UI design, on the other hand it is possible that the use of a mobile device is not required at all. On the next page figure 5a illustrates the interaction that the caregiver performs with a mobile device in an emergency situation. A certain level of frustration occurred during the the short period of time. However, during a day the personnel need to do other things as well with the devices, these actions are illustrated in figure 5b.
As described earlier, the features that could provide essential information about an individual customer in service events do exist in Iwo but those features seem to be disused. The disuse of existing features can be also explained by the overlapping patient information systems in care service unit which also explains the disuse of certain features. But again one can question whether the care service organization or the buyer has been informed and trained enough in order to make decisions that would enable them to utilize Iwo effectively.

This turns the attention to the overall service process of Wiktio’s and its sub-system networks. Figure 5c. illustrates the process from implementation and ramp-up till full and fully operational care service center for a longer period of time, the period seems to have peaks where the caregivers need to deal with technology. An update or replacement of an element in a system seems to lead to malfunction which needs to be solved. Such systems may have similar issues, at least the interview with a care service company’s CEO revealed that other provider’s systems have issues as well, and that they are “hopeless”. All in all, it seemed that there are very few who take an active role with technology in order to utilize it well.

5.2. Care Services and Social Network

Care service production consists of many actors that contribute to the wellbeing of the end customer. Care service personnel, the main users of Iwo, can be considered as the main group that is actively involved with the customer in various events. The relatives and friends are actors that know the person (the end customer) and understand one on another level than caregivers. Their initial input to the caring process is to provide information e.g. about a person with memory disorders. However, their role and contribution could be supported even more. Research about assisted living suggest that “..the social aspects of assisted living became increasingly notable, directly in the sense that members of the social network–family or friends – often help the elderly person shop for groceries, go to the bank or the pharmacy. In an indirect sense, the social network is also important as members of the network often monitor the condition of the elderly person in a subtle way” (Ballegaard et al., 2006) Interviews within this study suggested that improvements are also needed in communication between caregivers and relatives. The interviewed care service CEO and a relative of two care service customers both brought up clearly that relatives need to know more about their close one. Caregivers’ view on the subject was that they try to contact the relative every time they see it is required. Different organizations may have different policies when to contact and what to tell for who. Laws on privacy and self determination set challenges on how the information could be shared and technology could be developed in order to support both privacy and quality care (www.ktl.fi).

Figure 5a. illustrates the interaction that the caregiver performs with a mobile device in an emergency situation.

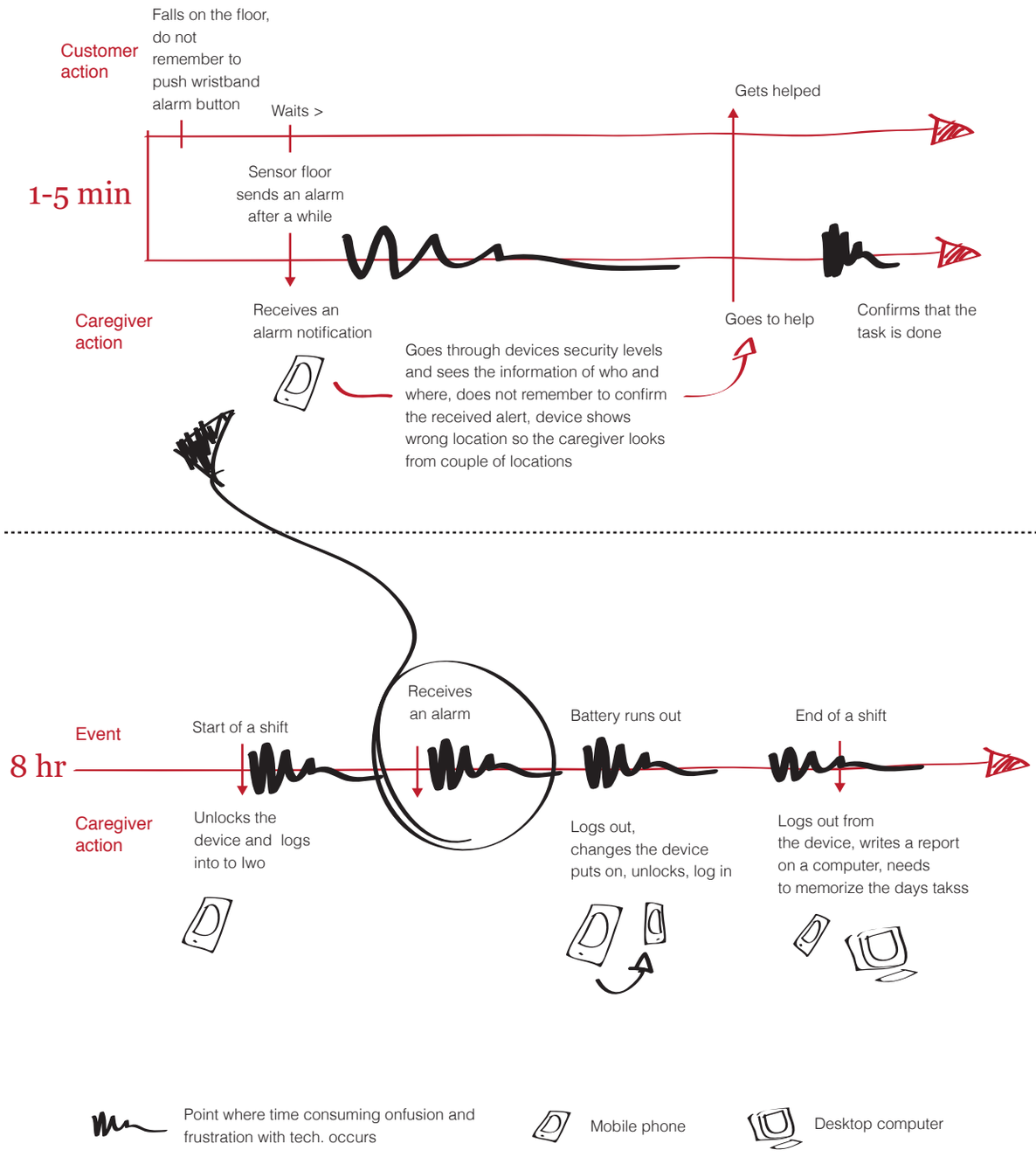
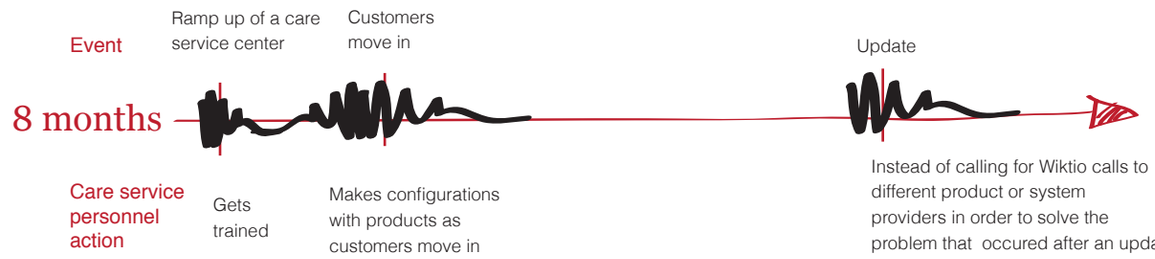


Figure 5b. illustrates events that can take place during a shift.

Figure 5c. illustrates the process from implementation and ramp-up till full and fully operational care service center



However, it also seems that as the end customer enters the life in care service center he or she becomes part of community that is controlled by healthcare professionals and care services personnel. The old person or disabled becomes part of world and rules of professionals while their relatives and other familiar people stay elsewhere. This division is even clearer in when looking at the technological boundaries, in this thesis context the professionals do not share (in practice) any communication platform with the people who are direct or inderict customers of healthcare or care services. Thus, there is lack of communication possibilities and the world of professionals and nonprofessionals remains stronlgy separate.

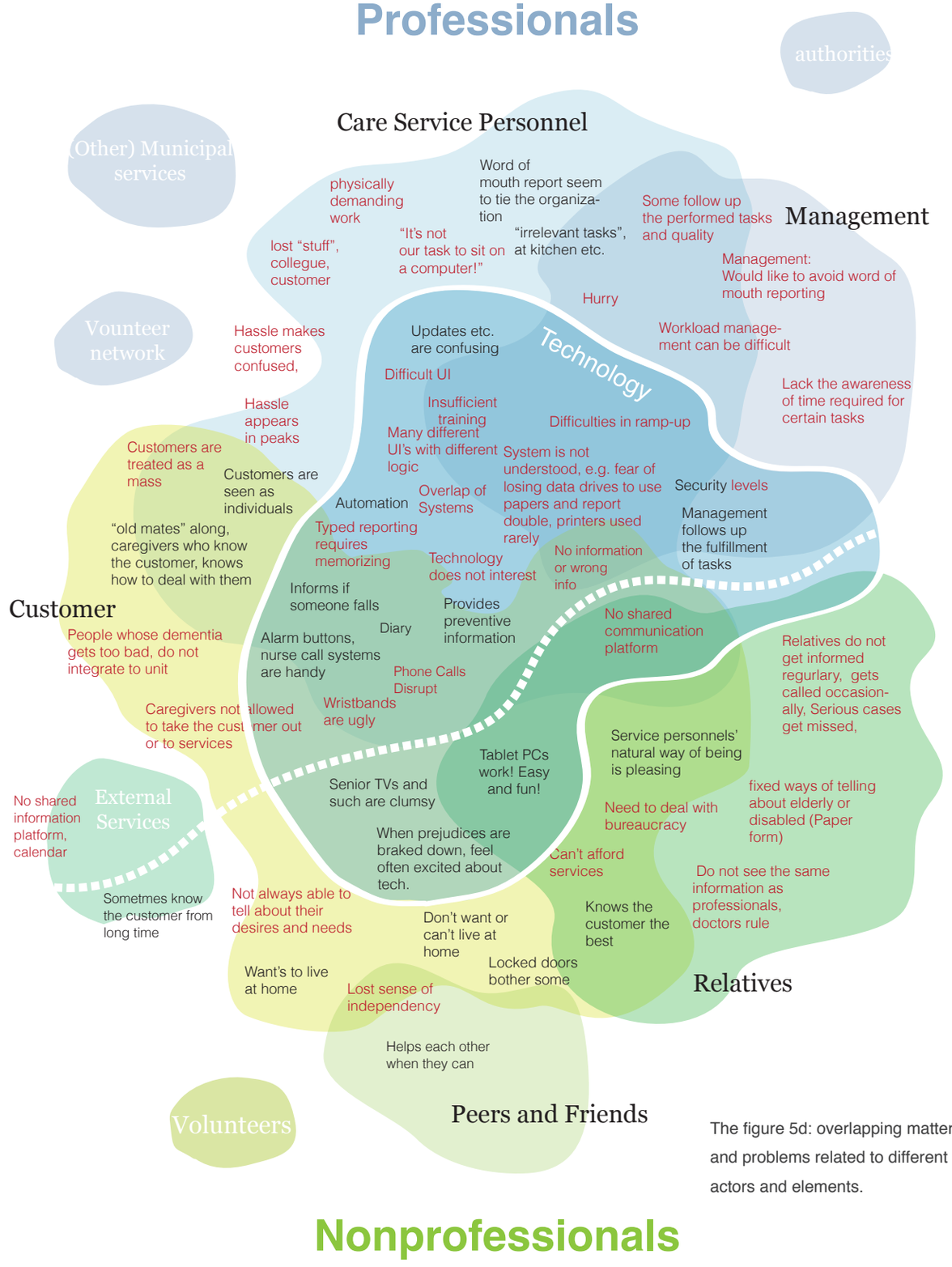
The above described division can be seen on the figure 5d that also presents the most critical issues and aspects indicated during this thesis work related to different actors. The figure 5e on the next spread uses the same figure as a background and maps the needs of actors, their relations. On the figure there are also questions regarding other actors such as authorities and volunteers that remain partly open within this thesis work, but could significantly have an impact on future scenarios.

Future

As the purpose was to find also opportunities beyond the conventional, the signals presented in chapter 4. that were not clearly related to the care service production seemed to provide signals to be seized. These aspects are more interesting if there is a desire to develop them more radically. The city policies aim to support individual needs both by offering the tools such as a service voucher as well as by promoting the care services to appreciate and support individuality. The changes and offering in housing can give opportunities to form communities but also to an individual to take care of him- or herself at home for longer. The services may be more and more integrated into the living and so on. These signals can be found in figure 5f which is based on the figure 5e. Arrows point the elements in care service production network that could be addressed.

The dashed round circle mark areas where the upcoming concepts aim to solve something. These seem critical areas to be designed in order to deliver support to the holistic wellbeing.

The areas overlapping the customer, peers and friends, and relatives seem to be like areas which could possibly challenge the existing care service paradigm. Reason why to propose something out of the existing system is simple: "..putting new actors into the same system will not improve the system's performance. What makes a difference is redesigning the system to improve the information, incentives, disincentives, goals, stresses, and constrains that have an effect on specific actors." (Meadows. 2008)



The figure 5d: overlapping matters and problems related to different actors and elements.

The figure 5e: Simplified map of matters and problems that are related to different actors.

Professionals

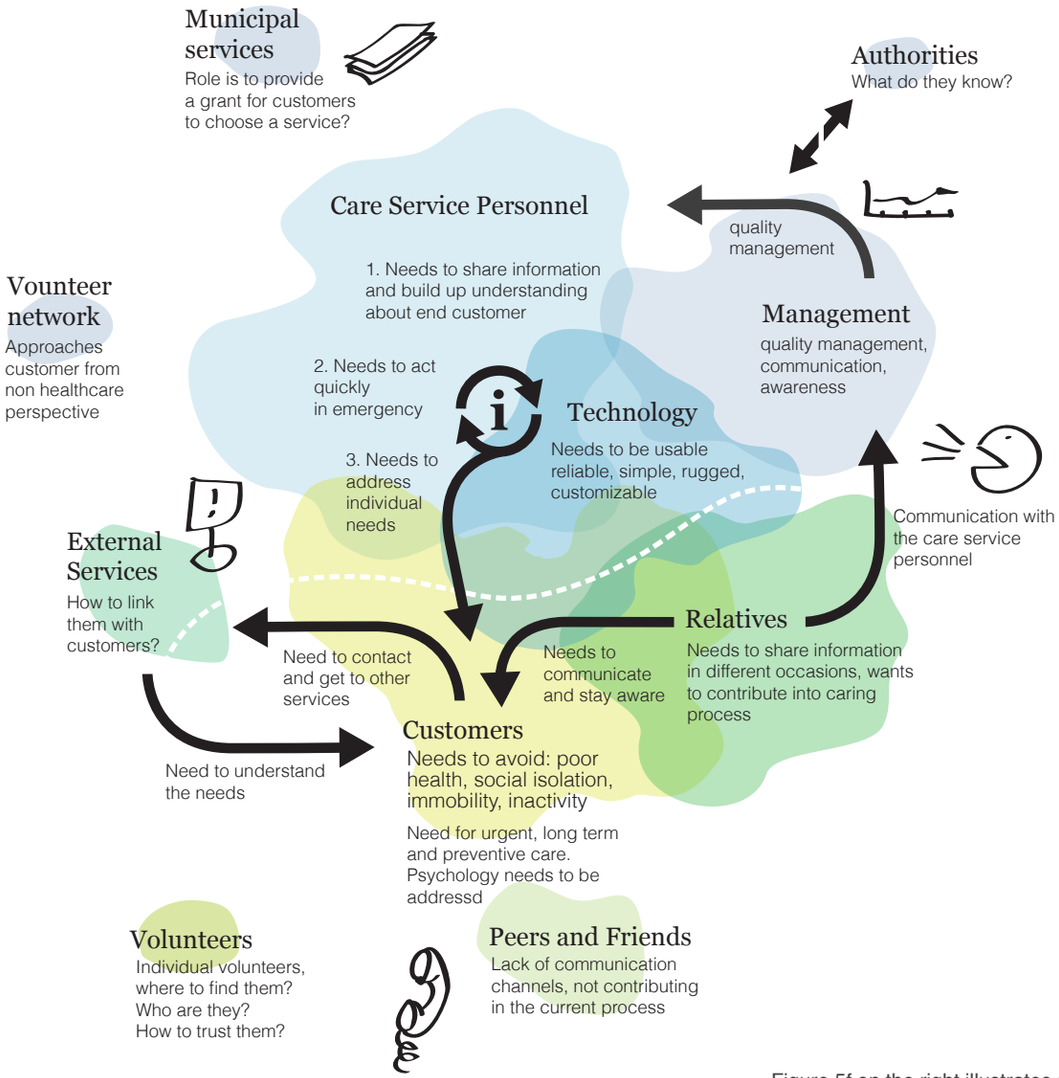
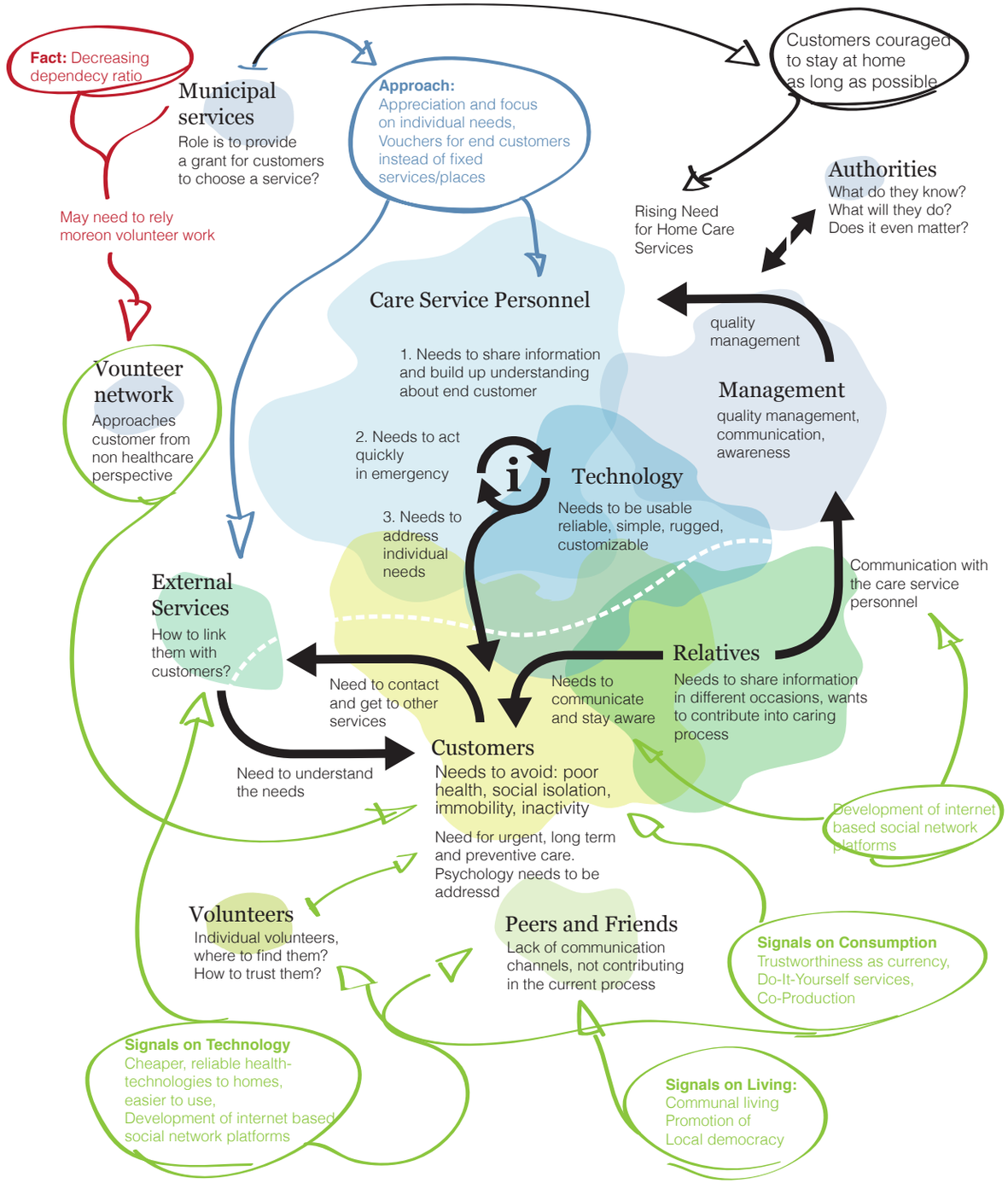


Figure 5f on the right illustrates signals that may have an impact in the near future on the care service production and indicated issues.

Nonprofessionals



Desired Technology

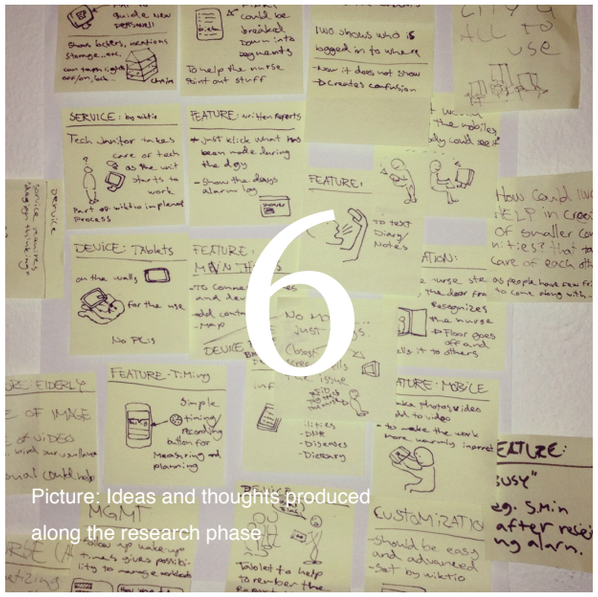
Rugged, simple, easy to use, informative, works, does not disrupt the workflow

Desired Relations

Stays in touch easily, stays aware, can contribute

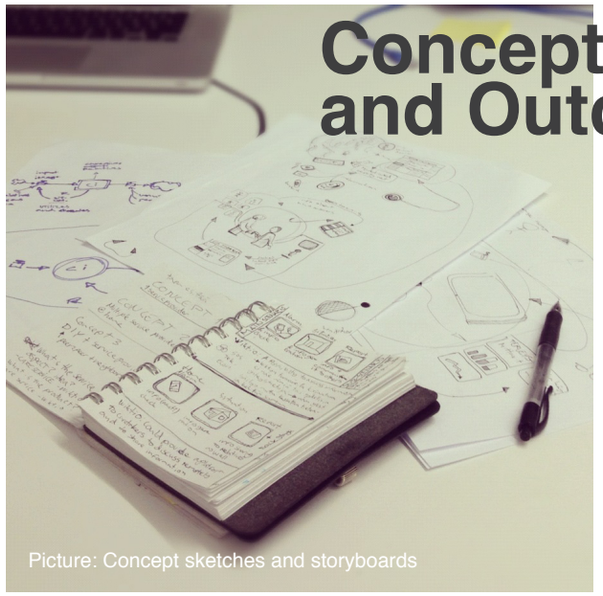
Desired Living

Feels like home, feel belonging, feel cared, natural way of being



Picture: Ideas and thoughts produced along the research phase

Concepts - Creation and Outcome



Picture: Concept sketches and storyboards

The earlier chapters looked at the role of Iwo system in the care service context and described what it consists of and built up an understanding of the world surrounding the context. The research phase inspired, brought up ideas, and fed the information for synthesis and concept creation. This chapter brings the ideas together and presents solutions for identified issues and opportunities. Ideation, development and final concept refinement has been carried out simultaneously during the research phase.

The purpose of concept creation and presentation is that it tries to give answers “what” to design. It also views the opportunities by combining understanding from technological, economical and from societal point of view. (Rosted & Høgenhaven, 2007) These aspects have been noted during the process, however the further analysis of the outcome is excluded from this work. In order to assess and further develop the outcomes more thoroughly the material could be filtered through technologic, societal, markets point of views. (For this Keinonen & Jääskö (2004) presents a useful model)

Results of this thesis can be described as future-oriented concepts as well as concepts for research and development of Iwo. Future-oriented concept design that will not necessarily give clear technological solutions for development, but is rather visioning that can be used as a strategic tool. Concept design for research and development can give more specific solutions and it can explore market opportunities for a user’s needs. In both categories the technologies can be radical with regard to the current paradigm. (Kokkonen et al., 2005) However, in this thesis work’s case the technologies are not necessarily that radical. If there is something radical even in such a (technically undeveloped) context, it is in the way the care work could be organized.

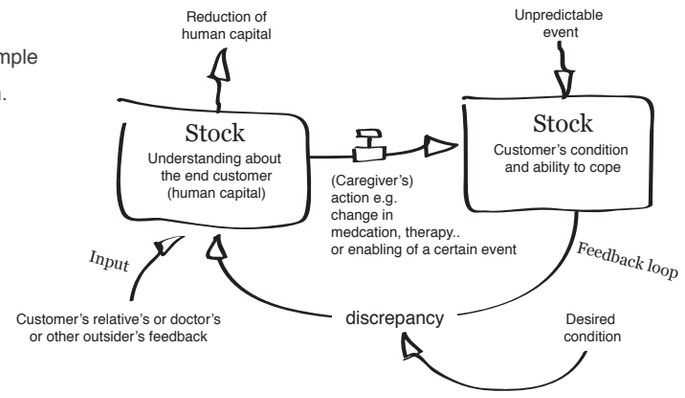
Two main product-service concepts have been built around use cases, or procedures, that can be found to be the most essential but also troublesome in the current technology and care service production.

- Utilization of existing information
- Dealing with different events such as emergency situation
- Reporting and sharing of information

In order to support the fulfillment of the end customer’s needs (chapter 1.3.3.) the above mentioned procedures and situation should be as streamlined as possible. embedded with meaning information, and open to different actors. The aspects have been the general drivers in the concept creation. In a current system, there are many things that disturb and takes time from the actual care work which requires human to human interaction. The current technologies do not either support, or make personalized information very evident.

Concepts are presented in form of scenarios and diagrams that illustrate the service evidences, touchpoints, actors and a service period. In fact, the visualizations are adaptions and combinations of service blueprints, storyboards and system diagrams to support the scenario and concept presentation of such a care service and PSS more concretely. Scenarios are stories which explore a particular aspect of offering (Stickdorn & Schneider, 2011). Thus, the scenarios will not speak for all the aspects of care service production and technology, but give a point of view. The reason why to adapt a systemic diagram into the representation is that care service production can be described as multilayered system, a set of things, elements, that have different inputs, stocks, and outputs (Meadows, 2008). Figure 6a is an example of how the a care service customer’s condition can be affected. As stated the information and understanding (of customers’ needs and desires, medication etc.) plays a critical role in service production. It is the human capital as well as the data on computers and in reports. This information is getting built up over time in various situations and actions. The situations can vary from a laughter-filled sauna session to an emergency situation where the customer gets hurt, all these can reinforce the knowledge capital of actors

Figure 6a: an example of system diagram.



who take care of the customer. The stock, the customer information, is not only about understanding of what are the customer's individual physical as well as mental needs and desires, but it is also about understanding how to utilize the information in different situations. How this well understanding can be used has an impact on customer's condition. Therefore, the two main concepts basically aim to build up the human capital, utilize it, and distribute it to meaningful actors who can again utilize it.

The following concepts comment on one specific situation but as mentioned, the situations are various. Concepts are rather raw, or could be called just ideas, and will need further research and development.

6.1. Concept 1. and 2.

First concept is based on the existing Iwo technology and existing care services and organization. The context of the concept is a private care service unit where the residents require extensive assistance because of physical inabilities or dementia. In this concept only the products change, the service periods from the caregiver's perspective are streamlined. More meaningful information is brought available into a situation where it is needed. Automation is increased, so that the time with customers could be maximized. This concept does not consider systems such as building automation or access control since those are not in the core of the practical care work. Design drivers for the concept are the following:

- Bring meaningful information available immediately
- Maximize automation of quantitative information generation and support qualitative reporting

- Minimize hassle and the need for using the technology in a case of emergency

The second concept would support the implementation of the above described system and ramp-up phase of the care service. It is especially care service center that include multiple units. Drivers for the second concept are:

- Minimize hassle, make the transition from implentation to ramp-up smooth by agile service that takes care of big and small problems on behalf of the personnel
- Enable help and training in real situations on the spot

6.2. Concept 3. and 4.

The third and fourth concept tries to break away from the current care service paradigm. The point of these is to explore how Iwo could be developed in order to help in do-it-yourself service formation. In these, the technology aims to engage different actors who surround the elderly or disabled people to contribute to the caring process; it moves the emphasis from healthcare professionals towards a social network or a community. However, concept still connects the self motivated group of people with services provided by professionals. This gives the opportunity for both groups to keep track on the service and contribute to the care process.

- Engage customer's social network by utilizing the existing domestic technologies
- Minimize amount of minimum set of products
- Give a possibility to form a customized care network
- Enable people who live close to help each other with small effort

The fourth concept is called Kiosk, and it is an extension of the Me & My concept. Basically it is a marketplace for the small service providers and volunteers. For people who need the services it gives an opportunity to buy and rate services online.

For a service provider the kiosk would give advice and tools to establish, bring visibility, and run a service. This way the small care service company's could gain appreciation and fame on a same level than big service companies do. Drivers for the concept are:

- List different actors who provide services related to care, cleaning services, etc.
- Provide a platform for customers or their relatives to order services.
- Provide tools, such as billing system, communication system, work lists, that are needed in keeping the service operational
- Connect authorities with the service providers and customers

1.

Wizard

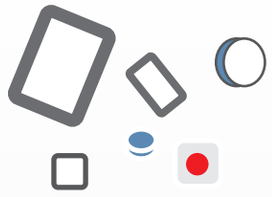
Wizard is for care service centers which accommodate people in need of excessive care.

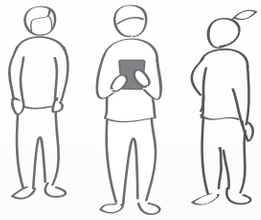
Wizard gives the care service personnel more time to focus their core work, supports it by giving right information at a right time, and gives possibility to share important information for all the actors involved in taking care of an elderly or disabled.

For..

Care service centers and units to..

- provide easy access to information for different actors
- enable preventive approach on care process
- make the workflow as smooth as possible





Products

Main products for the personnel are the mobile device (+user interface) and a web application that can be used from any internet device. Mobile devices are equiped with RFID tag. RFID readers are placed into a ctirical locations at the premises and gather information automatically for later use.

Resident's room has a movement sensors that recognizes activity and people's position. These products gathers data for preventive care as well as urgent emergency information. Alarm buttons are placed are placed next to a bed and into a toilet.

Users

Main users for the system are the caregivers, nurses and management. The end customer's relative's have also an access to their loved ones information and can follow up the care process and condition.

Information

Wizard compiles information for specific situations the user needs it. E.g. emergency, reporting, and care plan updates are different situations and the user needs different data in them.

Resident's information consists of personal information, acitivity data, treatments, latest events and alarms, quality of sleep.

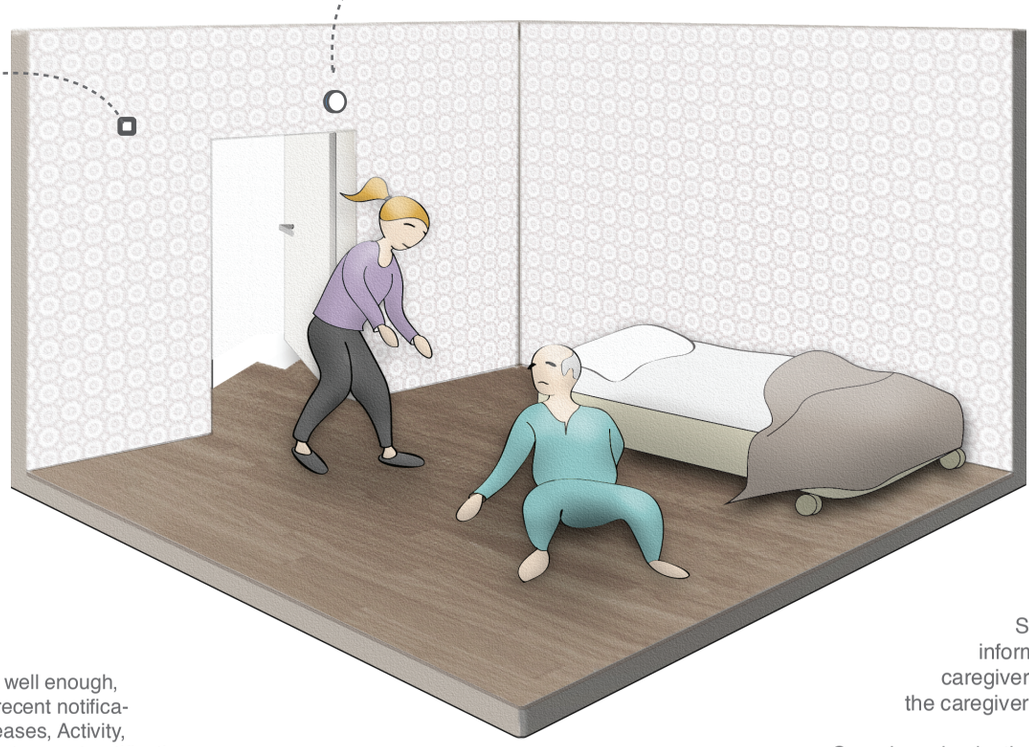
How Does It Work?

USE CASE: Caregiver receives an alarm, heads to the location, assists the resident, reports and shares the information.

ServicePeriod

1 A sensor detecs that a resident fell down on the floor and sends an emergency notification to his designated caregiver's mobile

3 As caregiver arrives to the room a RFID reader recognizes her and logs the information into the system



2

The caregiver has two options: to call for the resident, or confirm the alarm and head to the location where the alarm came from.

Since she does not know the resident well enough, she looks at the person's details and recent notifications Available information: DNR, Diseases, Activity, Incontinence, Ways and Means to Treat, recent notifications..

Caregiver has a possibility to call assistance

4

Service situations generate prefilled information such as where and when the caregiver was during the day in order to help the caregiver recall day's activities and tasks.

Caregiver checks the information and adds qualitative informations under. When the report is ready, it can be shared to other caregivers, management and to customer's relatives.

iwo

Caregivers and Nurses

As Caregivers and nurses start their shift they will have all the recent short term and long term information abouttheir designated customers available in every device they log in.

Care Service Management

The system gathers data in order to help evaluation of the service: is everything going according to care plan, or is there a reason to change the plan?

Management can also assess how workload is divided in between different units.Thus the system also works as platform for discussion for the development of the service.

Relatives

Relative has an easy access to information and possibility to contribute into the caring process

Janitor

Janitor eases the care service personnel's work during the launch of an service center. Janitor is a person who will take of anything related to technology and trains the the personnel on the go on a real situations where they learn best. Wheter it is about changing a light bulb or training of a newcomer, Janitor will take care of it.

3.

Me&My

Me & My is for people who need caring and assistance, and for families who want to stay aware on each other's well-being and activities.

Me & My gives a chance to build a connection between professionals, volunteers, relatives etc. who participate into life of a elderly or disabled person. It eases sharing of information, monitoring, and contribution to the caring process.

For...

..home environment, individuals, families, communities and service providers

To..

- enable preventive approach on care process
- prevent Solitude
- give tools for actors around the elderly or disabled to contribute to the care process

Products

The end customer can customize a set of products according to ones needs. Minimun would be a mobile device or tablet pc with an interner connection. If required, a set of different wellness-, heathtech, and security products can be connected to system.

User interface gives directs access to communicate, call for help, or request certain services from acquintances or professionals.

For the professionals and relatives Me&My offers ways to share and tools to follow the condition as well as the service performance.

Application

The community and information lives in the web application which stands alone, but is also embedded into most common social networks such as Google+ and Facebook. This way it is easy to connect anyone into the community and share information and information is brought to the context which are familiar to different participants.

It has features such as end customer's information, activity feed, diary, and calendar for planned services. Professionals can keep a record abouttheir visits and share them to relatives' of the customer.

Community

The community who is dedicated to care of the person can consist of family members, professional caregivers and nurses, volunteers and for example familiar neighbors. Different community members can be set to receive different requests from the user. E.g. In case of emergency, the closest familiar neighbors, volunteers as well as the relatives eceives a request to go to help.

The community stays aware of the person's activities and wellbeing.

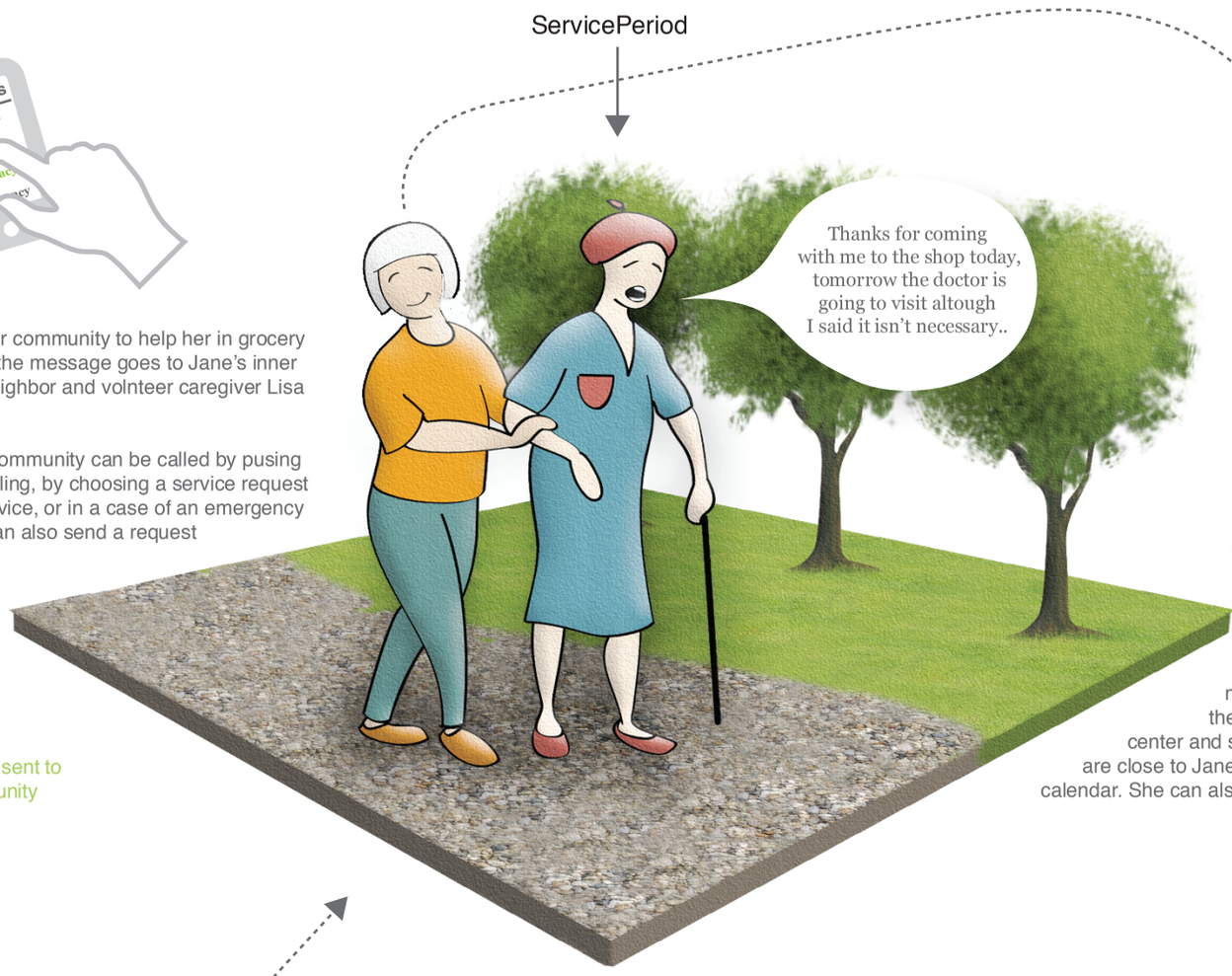
How Does It Work?

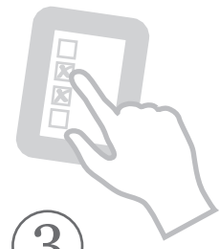
Scenario: Jane, 81, lives at home. She requests assistance from the people who are dedicated to take care of her in different situations.

1

Jane has requested her community to help her in grocery shopping. In this case the message goes to Jane's inner circle into which her neighbor and volnteer caregiver Lisa also belongs to.

In different cases the community can be called by pusing an alarm button, by calling, by choosing a service request from a list in mobile device, or in a case of an emergency the Certain products can also send a request automatically.

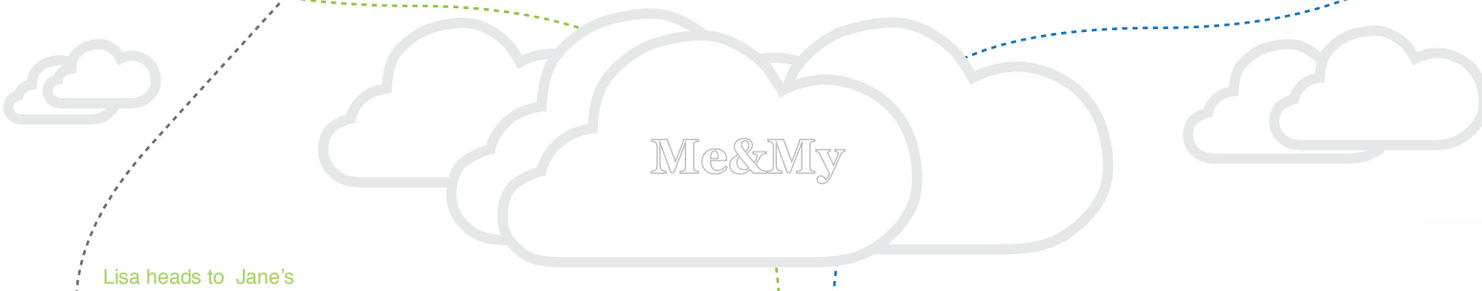




3

If Lisa wants to mention someting about the day'swalk at shopping center and share it with others who are close to Jane by typing it on Me&My calendar. She can also make just a little note just for herself.

Request gets sent to Jane's community members



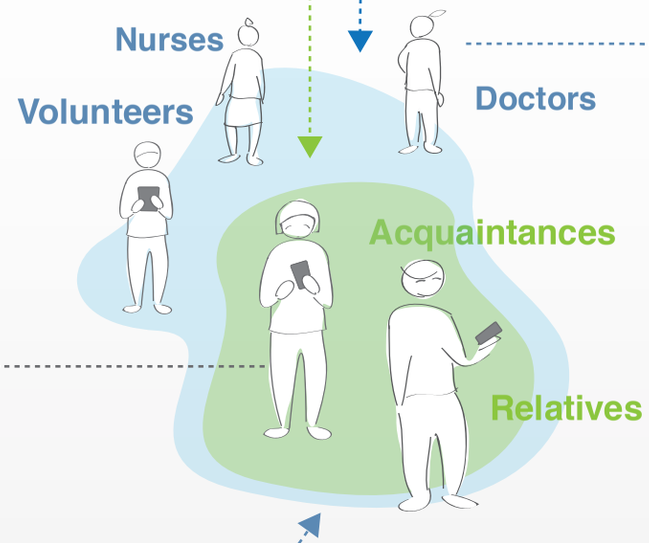
Lisa heads to Jane's place takes her to the market place.

2

Lisa,64, is among Jane's closest in Me&My community. Closest ones are the ones to receive the alarms and invitations first. This time Jane requests to go for shopping. Lisa signs for the invitation and calls Jane to agree on schedule.

In the case of alarm, the procedure would be pretty much the same.

Others in the community get informed about Lisa's answer to the request.



4

Information is gathered into the application and it can be monitored for example by a doctor or the person who takes care of Jane's care plan.

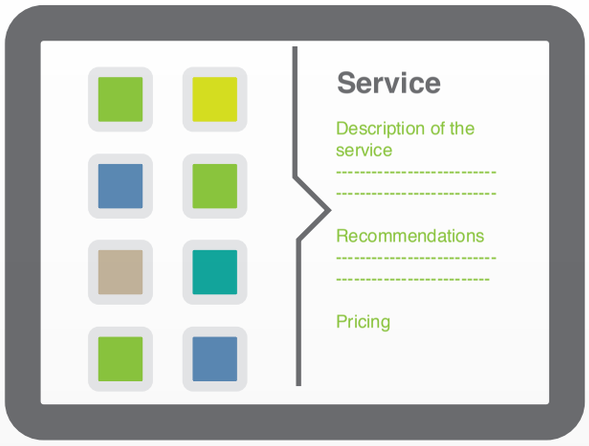
4.

Kiosk

Service Kiosk offers a way to buy or ask for and to provide care services and voluntary work.

For a professional service providers Kiosk gives tools for example for shift planning and billing to run their operations.

Kiosk customer has a profile page that lists ordered services and amount of financial support. Profile page is also viewable for an authority that is responsible over elderly or disabled.



7

Conclusions

This thesis took a look at Iwo technology product as a part of care service production and explored the role of it as well as looked for development opportunities for it. This chapter discusses the work and concludes the work.

The Project

The thesis project was fragmented over rather long period of time from late 2011 to October 2012. Since the client of the thesis, Wiktio, is a small company with a limited organizational resources and is still in a process of establishing its offering, functions and point of view, it has been difficult to orient oneself to the project and see the true value of it. The fact that the work's client relies on outsourced technical development was a major drawback for this thesis work. This basically meant that there was no other designers or developers who are able to work on the technology and who could have been used for the evaluation of findings, ideas and concepts. If there had been a possibility to feed insight and information for, and get feedback from the development team it would have given concrete implication on the go for the client and its partners but also for the author of this thesis. This affected also the starting point of the project which was an open field with too vague expectations (for the author) under a topic so vast. Thus, (as so often) it would have been better to frame the research even more strictly, or at least stick with framing and be more exact with the focus. On the other hand, this type of general approach gives various point of views to be discussed and is also more likely to provide a better view on what are the right things to research and develop further. However, the methods used in analyzing the data illustrate regularities with elements and connections and seem to work and help in indicating issues as well as opportunities. Procedures, bureaucracy, technologies, institutions, people's needs create a complex whole that the designers should understand in order to propose change. (Or should they, does it just become a burden that inhibits innovation?)

Answers and Results

As in healthcare where information technologies improves the quality and efficiency of the service, in care service production technology can make the same if it is in the right place at the right time. Iwo's key role in care service production is to work as an information mediator for its users. The care service personnel's task is to utilize the information in order to give care that addresses the various needs of the end customer, the elderly or disabled. The utilization however has to made possible by providing technology that works for the actors that surround the end customer. Other actors' outside the care service context such as friends and family may have significant impact on the end customers' wellbeing. Thus, it is would be important to build systems and environments that are not that strictly separate from each other. Different actors' awareness, possibility to share information and to ability to contribute in to the care service process must be emphasized.

The results, the concepts, of this thesis aimed at a discussion about the directions to which such a technology could be developed. By using the methods and illustrating issues and opportunities the concepts can be evaluated and used as inspiration for further development. However, there would still be work and research to do in order to understand better and prove the indicated opportunities, and if that journey continues it must involve also the people who will finally implement and contribute to the system.

Further Research

Even for such a professional technology as Iwo currently is, the most intriguing areas for further research and development would not be found under the title of healthcare or care services as such, but they would rather be related to do-it-yourself services and enabling of them. As mentioned, even though people would start to take care of themselves ever more, there will always be need for professional (health)care and the need for human interaction. Thus for Wiktio of this thesis, there could still be a chance to develop the product into an affordable set of services, devices and software products for the aging society and for service providers. Innovations in this context are expected, but even though there is change in the air, the care service systems and big private service providers seem to be bond into policies, so bureaucratic machines to maneuver and transform that it is highly unlikely to expect radical changes from these actors. Thus, the next big care service related technological innovation must be also social, it will not happen overnight, it will not be made by a single actor with a single solution. It is more likely to be built up through various medias in various areas of life.

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